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THE TREATMENT OF ATROPHIC RHINITIS BY MEANS OF AN ORO-NASAL CANULA.*

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The problems of atrophic rhinitis remain unsolved. Many theories are advanced as to its etiology and pathology. Even as to its diagnosis we are not always certain; its prognosis is bad, and its treatment purely symptomatic. Sclerosis of the middle-ear has been termed "das Schmerzenskind der Otologie," and with equal justice, atrophic rhinitis may be called "das Schmerzenskind der Rhinologie."

In recent years there have been some very interesting researches concerning the nature of this disease; and in this paper, it shall be my purpose to briefly review some of the later literature on this subject. The theories concerning its origin may be divided into first, the infective or bacterial; second, the theory of secondary involvement from sinus disease; third, that it is a trophoneurotic or nutritional disease.

By some, the Bacillus mucosus of Abel and Löwenberg (1) is regarded as the exciting cause. This micro-organism is closely related to Friedlander's bacillus, and is usually found in great abundance in the nasal secretions of those affected with this disease. The mere presence of the micro-organism, however, does not necessarily mean that it is causally related to the disease. The researches of Döbeli (2), for example, show that bacteria

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do not appear in the secretions until several hours after the diseased mucosa has been cleansed.

Cholewa and Cordes (3) were unable to find the bacillus within the tissues of their carefully prepared sections; in fact, it did not even invade the epithelium. They point out that a micro-organism which merely rests upon a diseased tissue can scarcely be regarded as an excitant of disease; although they admit that its presence under the crusts must aggravate the disease process. So constant is its presence that Cholewa in doubtful cases, regards its determination of great diagnostic value. The Bacillus mucosus then is rather constantly present in atrophic rhinitis, and is associated with the production of the fetor, and by its presence tends to aggravate the disease process, but it cannot be regarded as its cause.

Bosworth (4) insists that atrophic rhinitis is a sequel to a purulent rhinitis of childhood, but names no specific organism. The incidence of atrophic rhinitis (5), as shown by the examination of school children, would not tend to bear out his hypothesis.

Grünwald (6) claims that nearly all cases of atrophic rhinitis are attributable to secondary manifestations of sinus disease, in fact, he would trace all such cases to a focal suppuration, and claims that after the original nidus has been cured the picture of atrophy will disappear. In many instances, no doubt, this is the case, but certain facts prevent a general application of this rule.

Freudenthal (7) for example, cured a case of antrum disease associated with atrophic rhinitis without, thereby, in the least affecting the atrophic process. Minder (8) presents this same argument. In Case I, of this paper, the patient presented symptoms of acute frontal sinusitis and this subsequently subsided. Finally the recent work of Döbeli (9) is conclusive. He set himself the ambrosial task of studying his cases of atrophic rhinitis hour by hour. After thoroughly cleansing the nose, he found that the secretion began to appear at certain minute points distributed on the turbinated bodies, as well as on the septum, and often in positions which precluded its origin from the sinuses. Hour by hour he watched these spots grow and finally coalesce and form the characteristic crusts. His studies further show that former ideas concerning the nature of the secretion were entirely erroneous, since he found it to be made up chiefly of leucocytes which come to the surface by diapedesis from the underlying mucosa. During the later hours epithelial cells and bacteria appeared, and with the

latter also the fetor. Döbeli regards the mucous membrane in this disease as abnormally permeable for leucocytes.

A study of this subject is in no way complete without considering the work of Cordes and Cholewa (10). Briefly stated, they found the chief, and often the primary changes, not in the mucous membrane, but in the underlying bone. The latter shows a process of resorption and softening, not of an inflammatory nature, and regarded by those authors as a form of osteo-malacia. Their drawings really show two distinct disease processes, first an osteomalacia; and secondly, a chronic inflammation of the mucous membrane, associated with changes in the epithelium and the glands. Their theory revives the theory of a purely trophic disease in a new and concrete form.

If the riddle of the cause of atrophic rhinitis remains unsolved, its treatment also is far from satisfactory. In general it may be stated that the efficiency of therapy is in inverse ratio to the number of remedies recommended, and this is undoubtedly true of atrophic rhinitis, for which a host of measures has been tried. These vary from the use of alkaline cleansing agents and local irritants, to the injection of diphtheria antitoxin, or the breaking of the diseased turbinate bone. The cautery and electrolysis have had their adherents and denunciators. Paraffin has been injected under the mucosa with the idea of closing the wide lumen of the nose. Gottstein's tamponade frequently repeated has proven advantageous. One author (11) recommends menthol, formaldehyde, icthyol and gomenal, but speaks of "the desperate straits befallen the therapeutics of this obstinate condition." All the text books give long lists of remedies.

The accepted treatment is purely symptomatic and aims at two goals, namely: first, to cleanse the nose of the tenacious, foul crusts and to keep it clean; and second, to stimulate the diseased tissue and, if possible, to check the course of the disease. In their last analysis all the effective methods come under these two heads.

Sometime ago it occurred to me that the defective secretion in atrophic rhinitis might, in some way, be corrected by introducing a flow of saliva into the nose, and that, further, this saliva might have a therapeutic effect in modifying the atrophic process. It appeared feasible to constantly cleanse the nose and to supply it with moisture by establishing a small fistulous tract (anastomosis) between the oral and the nasal cavities, in other words, by producing a form of artificial perforated palate for a therapeutic effect.

Into this perforation a small permanent tube might be fitted, and through it the patient could, at frequent intervals, force saliva into the nose, and thus cleanse, moisten, and stimulate the interior of the nose. This, too, would prevent the compressing effect of the dry crust which Grünwald (op. cit.) has compared to the action of collodium. The presence of moisture in the nose would also tend to prevent complications of pharyngitis and laryngitis sicca.

I further believed that the saliva being a secretion and foreign to the parts, would perhaps exert a stimulating or irritating effect upon the diseased mucosa and would thus reproduce one of our therapeutic endeavors. Reasoning by analogy, and in support of this hypothesis, it may be stated that a physiological secretion will generally irritate a surface unaccustomed to its presence; for example, the gastric juice irritates the skin after the gastrostomy, similarly the bile from a cholecystostomy. In salivary fistulae, the skin becomes eczematous from the constant irritation (12).

According to the statement of Kyle (13), the salivary and nasal secretions are chemically almost identical. Still the saliva contains ferments and bacteria not found in the nose and might reasonably by expected to act as a mild irritant. A further possibility was that the flora of the mouth differing from that of the nose might crowd out any specific bacteria of ozena.

Certain additional practical considerations also favored treatment by this method. The quantity (14) of saliva, 1 to 2000 C. C. in twenty-four hours, would certainly suffice to keep the nasal mucosa bathed in fluid. A further fact of importance is that while ozena often effects the pharynx and larynx, it is never known to invade the mouth, thus showing some specific resistance either in the buccal mucosa or in the saliva itself. Finally, it was apparent that the patient could conveniently use irrigations of water from the mouth through the tube, provided the salivary secretion proved insufficient.

Accordingly, I have devised the following operation for the introduction of a permanent canula between the mouth and nose. The floor of the nose and the roof of the mouth are cocainized and adrenalized; cocaine being then injected into the periosteum of the roof of the mouth by means of a hypodermic needle bent at an angle. A point is selected in the hard palate where it shelves off and becomes horizontal, and about one C. M. from the median raphe. Here a crucial incision is made with a curved, pointed bistoury. With a sharp periosteotome the periosteum is pushed back, exposing the bone. The patient is now instructed to open the

mouth as wide as possible. With a guarded bone drill 3/16 inch (5 m. m.) in diameter an opening is bored through the hard palate into the nose. Care must be taken not to strip up the mucosa on the floor of the nose. This can be avoided by nicking the mucosa with the curved bistoury introduced through the trephine opening. This operation requires but a few minutes.

After treatment.—The artificial opening is now closed by introducing a flanged rubber plug which fits snugly against the roof of the mouth. The best for this purpose are those used for the repair of bicycle tires. These may be perforated and saliva can be forced through from the beginning of the treatment. The after treatment continues with daily removal of the tube until the oral and nasal mucosae have united. Granulations must be kept down with nitrate of silver and antiseptic mouth wash. This after treatment is very tedious, and trying both to the patient and surgeon.

Fig. 1. Oro-Nasal Canula. Sectional View. Actual Size.

In Case II it required four and one-half months, while in Case III with better technique, it took but seven weeks.

As soon as the edges of the bone have healed the permanent tube, which I have termed the oro-nasal canula, is introduced. This canula consists of a German silver tube one inch long and 1/16 of an inch outside diameter. About the oral extremity of the canula is a hard rubber collar provided with a flange 1/4 inch diameter, which may be moulded by a dentist to fit the opening of the roof of the mouth. The tube, when in place, fits very much like a hollow nail driven into the hard palate. The nasal extremity of the tube should extend to the level of the lower border of the middle turbinate body. The canula is self-retaining, and may be removed by the surgeon (or patient) and cleansed, if necessary.

Owing to the fact that ozena occurs in persons with wide nasal cavities, the so-called chamae-prosopia (15), there is usually ample

room for the canula within the nose. With the canula in place, the patient can readily force saliva into the nose, using his tongue as a force pump. The saliva may be seen to enter the nose, and forming bubbles spreads out along the lower border of the middle turbinate and along the inferior turbinate and septum. The course of its flow may be easily studied by putting methylene blue into the mouth of the patient.

In the usual course of atrophic rhinitis the inferior turbinate is involved sooner and to a much more marked extent than the middle turbinate (15), so that the saliva reaches those portions of the nose

Fig. 2. Sectional View, showing the Oro-Nasal Canula in Position.

most affected. In addition to constantly bathing the nose with saliva, the patient can readily force water from the mouth into the nose. By closing the nostril on the operated side and holding the head forward, the water will run through the choana and out on the other side. The lumen is kept clean with a wire bristle. By placing the tongue over the orifice of the tube, the patient can prevent fluid nourishment from entering the nose. There is no interference with phonation.

I have three cases to report, in which I have performed this operation.

CASE I.—Mr. B. V., printer, age 27. Consulted me in July, 1904, complaining of pain over the left eye.

Family History.—One brother has atrophic rhinitis (as determined by me in a subsequent examination).

Personal History.—This patient had typhoid during infancy. Patient has had crust formation in his nose for an indefinite period past. He would force water up his nose to clear it of the crusts. The patient would occasionally grow hoarse at night. Onset of present trouble began about a week ago with discharge from both nostrils. The pain over the eye was worse in the morning; *status presens.*

Examination.—Temperature normal. Marked tenderness over the left middle frontal sinus. Hypertrophy of the anterior of the

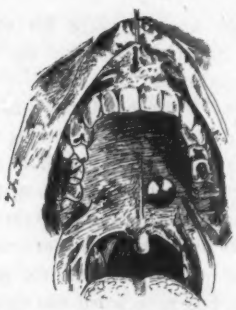

Fig. 3. View of Roof of Mouth, showing Oral Extremity of the Canula fitting against the hard palate.

left middle turbinate with pus at this point. Atrophy of both inferior turbinates to a marked degree. Pharynx visible through the nose on the left, but not on the right, owing to slight deviation of septum. Pharynx dry and glazed. Scarcely any fetor.

Diagnosis.—Acute frontal sinusitis; and atrophic rhinitis.

Treatment.—Sinusitis resolved under local treatment in a short time. Operation for introduction of oro-nasal canula was performed August, 1904, an opening was made through the roof of the mouth and the opening plugged with cotton. The tube inserted after one week, but I removed it September 12, 1904, as the edges had not healed.

I treated the granulations with trichloracetic and silver nitrate.

October 4, 1904, the tube was reinserted, although the edges were not healed.

November 12, 1904, the tube was reinserted.

December 3, 1904. The patient now wears the tube with much comfort, forces saliva through freely, and notices fewer crusts in the nose and less dryness in the throat. Some (objective) faint odor in secretion. Crusts not so hard and come out easily when the patient blows his nose (formerly had to blow very hard); crusts not so large and numerous (formerly they were as large as his thumb). Patient occasionally washes out his nose with water from his mouth. Left side free from crusts except about the tube; dry crusts on the right side. (This was noted after the patient had refrained from washing out his nose for one week.)

May 13, 1905. Reinserted tube after having removed it for about three weeks.

June 3, 1905. Tube now in place for three weeks past. No soreness of mouth; mucous membrane on the left side appears healthier than on the right side.

September 12, 1905. Patient returns with tube in place; tube does not irritate. Reports hardly any crusts on the left side; right side is dry, with crusts more abundant and more tenacious. Washes out nose once every morning with water forced through the mouth. Can wash out the right side by throwing his head backward and then towards the right. Throat is now freer from crusts and more moist than it was before the tube was inserted.

NOTE.—This patient has now worn the tube practically continuously since May 13, 1905, *i. e.*, for four months, and for a period of ten months, barring an interval of three weeks. He has felt so comfortable that he has not found it necessary to consult me for the past three months.

CASE II.—Mr. C. B. K., piano tuner, age 25; consulted me, April 14, 1903, complaining of bloody crusts in nose and noises in left ear.

Family History.—One sister has catarrh; she loses sense of smell occasionally, but has no crusts. Four boys and one girl. Sister is the oldest; patient is the youngest. Next brother would get "running spells," would run from one half to one hour without realizing what he was doing, but is now well.

Personal History.—Always well until six years ago, when he has epilepsy. Admits gonorrhoea, and denies syphilis.

Present Illness.—Trouble in nose began about six or seven years ago with clogging up with crusts. Couldn't breathe through the

nose, and would remove crusts by running the little finger into the nose; could run finger into opposite side (through perforated septum). Nose would bleed profusely thereafter; crusts would form again before morning, *i. e.*, it would clog up again before morning. Throat would become parched from breathing through mouth, especially mornings. Would lose sense of smell during winter months.

Diagnosis.—Tubal catarrh (left); atrophy of both inferior turbinated bodies. Hypertrophy of the right middle turbinate; perforated septum (syphilis?) No fetor.

Treatment.—Oil atomizer; local application of iodine, and the use of the nose cup with saline solution, which would clear the head, but only for a few hours. Patient would use cup two or three times a day. This treatment was continued for about a year, when patient returned complaining of not being able to breathe freely through the nose. Enlarged middle turbinate was removed July 1st, 1904. This operation gave considerable relief. Patient also received antisyphilitic and antiepileptic treatment.

Operation for insertion of oro-nasal canula was performed February 18, 1905. This case required prolonged after-treatment until the artificial opening in the hard palate had healed. Patient suffered from two epileptic seizures, caused by manipulations in the nose and once also had the packing drop into the larynx while asleep, but coughed it up. The permanent canula was inserted June 17, 1905. Patient had first found the tube somewhat annoying, owing to the passage of air through the same while talking and smoking. There was also some soreness under the plate.

As a result of this treatment he reports that the crusts can be much more readily removed by keeping them moist with saliva. He very seldom finds it necessary to use saline solutions as an adjunct to the canula. He uses the nasal irrigation but once a day, and finds that crusts do not come out in lumps as formerly, and that the quantity of crusts is about half what it formerly was.

July 15, 1905. Patient reports that he has used the nasal douche but twice during the past week, and has found the use of the oro-nasal canula much more convenient. He washes out the nose two or three times a day by forcing water from the mouth through the canula and into the nose. (I always have this tube with me, he says). Owing to the perforation in the septum he is able to wash out both sides at once. He forces saliva through quite frequently during the day. The mouth is not sore, there is no odor, there is slight annoyance while drinking, but not enough to speak of.

July 22, 1905. The tube was removed owing to slight soreness in the mouth. Some granulations had formed and these were treated with nitrate of silver, and the tube was re-inserted.

July 29, 1905. Patient reports no further trouble since the tube has been reinserted.

CASE III.—William R., age 13 1/2 years, school boy. Complained of lumps in nose (crusts); blowing them out caused earache.

Family History.—Negative.

Personal History.—Measles, whooping cough; no diphtheria, otherwise well. Onset of present trouble began three or more years ago. Boys around him complained of odor; teacher gave him a separate seat in school. Big crusts in nose; would have to blow "insides out" to get them out, and this caused earache; tried tablets and atomizer for two years; then salt water, and carbolic spray. Nothing availed. Went to Ohio Medical College clinic, June 28, 1905, and was kindly referred to me by Drs. Mithoefer and Hinnen. Inspection showed numerous thick, dry crusts, and foul odor in both nostrils. After removing crusts I found marked atrophy of inferior turbinated bodies. Pharynx was visible through the nose. Partial atrophy of both middle turbinates, especially in posterior portions. Drums opaque, slightly retracted.

Diagnosis: Atrophic Rhinitis with ozena.

Operation, July 10, 1905. Cocaine and adrenalin anesthesia. Bone drill (hand) left side; rubber canula.

July 15. Numerous foul smelling crusts; both sides, but little reaction locally.

July 18. Slight swelling about opening; somewhat tender. Rubber plug.

July 25. Opening less tender.

July 30.—Beginning to heal; daily removal of plug by patient. Nitrate of silver locally.

August 2. Ditto.

August 3. Tube loose, owing to large opening. Gauze packing.

August 29. The edges of the opening have now healed, and the permanent canula was introduced.

September 6. Patient wears the tube with comfort. He has a scant flow of saliva and therefore washes out the nose through the canula at frequent intervals. By closing the nostril on the operated

side and holding his head forward he can force water through the canula into the nose through the choanae and out of the opposite side. He succeeds in keeping the operated side clean, but crusts are still present in the unoperated side. The fetor is now much diminished.

September 13. Patient now has a freer flow of saliva which he forces into the nose every hour or so. Crusts are now much smaller than before operation. The left side very seldom has large crusts. He has been forcing saliva all morning. Inspection shows a large crust about the tube and partly covering the lower turbinate on the operated side, otherwise the left side is moist and clean. On the unoperated side there are large, dry crusts which are difficult to remove with a probe. There is a slight fetor still present.

Conclusions.—The analysis of these cases shows that all three wear the canula without any discomfort. Case II, for example, has not had the tube disturbed for the past four months. They all find it a convenient method of moistening and cleansing the nose. Case I relies chiefly on salivation; Case II on salivation and irrigation; while Case III with scant salivary flow relies chiefly upon irrigation. All three state that they have fewer crusts than heretofore and that these are much less tenacious. Cases I and II have less dryness in the throat than formerly. The sense of smell is more acute in case II than before operation.

Objectively, I find the mucosa on the tube side moist, and the secretion when present is usually semi-fluid, and not tenacious; on the other side the crusts are thicker, drier and more adherent. The mucosa on the tube side has a healthier, smoother appearance than that of the unoperated side. I can, as yet, make out no regeneration of the mucous membrane in any case except Case I, where the flange of the tube has rubbed the inferior turbinate. As regards the ozena, Cases I and II were practically without this symptom from the start, while in Case III there was very marked ozena prior to operation, and is now comparatively free from this sign.

The results in these three cases have certainly been satisfactory and warrant a further trial of this method. In the future, it will be necessary to elaborate the method and either to introduce a canula into both nasal fossae, or to devise a Y-tube which can be introduced into both sides by perforating the septum.

The results in these cases agree closely with those observed by FitzGerald (16), who has his patients moisten the crusts by means of plegets of cotton saturated with saliva, he says: "We have no

place in nasal treatment for the spray or douche, not even in the most exaggerated cases of atrophic rhinitis, or when complicated with ozena. I see these patients three or four times a week, removing the crusts with forceps after moistening them with a wire cotton-wound applicator saturated with the saliva of the patient. The patient must be instructed in the use of the applicator and use it moist at least three times daily. He should also exercise his nostrils frequently. Patients who follow this method carefully, seldom have even minute crusts or any fetor after the third week. It is usually necessary to pursue self-treatment for an indefinite period, but patients do not object to this, finding it much more simple, agreeable and efficacious than other methods."

Before concluding this paper I wish to express my appreciation of the kind assistance and valuable suggestions of Dr. B. J. Wolff, who constructed some of the canula for me.

Considering the fact that the pathology of this disease is unsettled, that the accepted therapy is a failure, Bosworth (18) for example, has never seen but one cure in all his experience, I feel justified in bringing forward this method which promises to alleviate and perhaps cure this malady, which hitherto has baffled the efforts of the rhinologists. This paper is presented with the hope that some of my colleagues here present will try this method.

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22 West Seventh St.

DIFFUSE INFILTRATION OF THE RIGHT SIDE OF THE NASO-PHARYNX WITH PARESIS OF CRANIAL NERVES.*

BY OTTO T. FREER, M.D., CHICAGO, ILL.

The patient, a porter by occupation, is forty-six years old. He states that excepting scarlet fever in childhood, he has never had an illness until the one which afflicts him now. His family history is negative, and his habits exemplary. The scarlet fever left him very deaf in the left ear, but the hearing in the right ear was perfect until his present affection, which began in July, 1904, with ringing and rushing sounds in the right ear soon followed by slowly increasing deafness. In November, 1904, he began to have pain, extending over the entire right side of his face to the median line, and also felt in the temple and scalp as far back as the ear. This pain has never ceased, and in consequence, he has not had a good night's rest during the past year, especially as the suffering is worse at night, subsiding in a measure in the daytime. Since May, 1905, he occasionally has a sensation as if flies were crawling upon the right side of his face and the same region is at times the seat of abnormal sensations of heat and cold. The pain affects all of the teeth, which are sound, on the right side of the upper and lower jaw as far as the center, and the same teeth feel numb when he chews. This unpleasant sensation and a sense of powerlessness in the right half of the jaw have led the patient to masticate with the teeth of the left side.

On the 20th of March, 1905, he was operated upon in a hospital, the constant pain in the right side of his head and face having led the surgeon to suspect brain tumor, so that the skull was opened in the right temporal region. Shortly after this operation he saw double, and some weeks later his right eyelid began to droop, the lid for the past six weeks remaining completely closed, though it could be raised by a great effort, up to October 2nd, 1905. He has never had vertigo nor vomiting. He has a constant slight tremor of the hands which he claims to have had since childhood. His right nostril is partly obstructed, and is apt to close entirely at night.

From descriptions he has given he has evidently had treatment with mercurial inunctions and iodide of potassium, last winter.

* Read before the Chicago Laryngological and Otological Society, October 3, 1905.

Examination shows the right membrana tympani cloudy except in the region of the light reflex. It is strongly retracted.

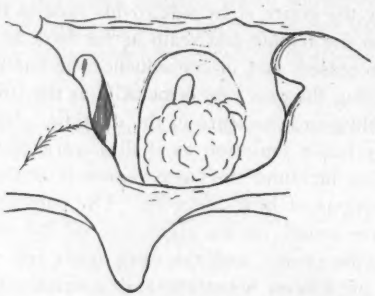
The left membrana tympani is the seat of two large perforations above and below the malleus. The ear is dry.

The watch can not be heard in either ear. In Weber's test all of a number of forks, beginning with C2, 16 vibrations up to C of 2048 vibrations, are heard best in the right ear.

Rinne's test is negative in both ears.

In the Schwabach test he hears the A fork thirteen seconds longer than normal and in the right ear.

All tones of the Galton whistle are readily heard in the right ear but the left ear perceives only its loudest lower tones and hears the low forks proportionately better than high ones.



Post-nasal view showing infiltration of tubal region on right side and normal Eustachian tube on the left. The left inferior turbinate is hypertrophied. Dr. Freer's case.

Whispered numbers are not heard in the left ear and only the loudest voice close to it. Before inflation with the Eustachian catheter, whispered numbers are understood in the right ear when the mouth is very close to it, and spoken numbers are heard at eighteen inches. After it has been inflated, the right ear perceives whispering at three inches, and the voice at three feet, instead of eighteen inches. The conclusion drawn from the hearing tests is that the deafness in the right ear is due to imperfect sound conduction, and that the right labyrinth and auditory nerve are intact. The affection of the left ear is evidently an old post scarlatinal condition that has no connection with the present trouble.

At my request, Dr. W. Franklin Coleman examined the eyes for me and reports as follows: The vision in the right eye is 20/30

minus, not improved by glasses. The right eye is equal to Snellen 1, 75 at twelve inches. With a lens of three diopters plus, it equals Snellen 0, 8 at twelve inches. This shows that the accommodation of the right eye is paralyzed completely. The vision of the right eye is, however, also deteriorated independently of the loss of accommodation as shown by the diminished vision for distance under all conditions, this proving that the function of the optic nerve is interfered with. The fundus, however, appears normal, the lesion to the optic nerve not changing the ophthalmoscopic image. The vertical aperature of the right lid is about four millimeters when the patient raises it by the aid of the occipito-frontalis muscle. Up to the day of Dr. Coleman's examination, Oct. 2nd, however, he was able to open the eye nearly completely by the use of the levator palpebrae, which is now completely paralyzed. The right eyeball can be moved outward only ten degrees, inward fifteen degrees, upward and downward ten degrees. The right pupil is slightly dilated, and four millimeters in diameter, the left pupil being three millimeters across. The right pupil reacts but slightly to light and not at all to convergence. The tension of the eye is normal. There is no exophthalmos. A test with cylindrical glasses shows paralysis of both oblique muscles of the right eye. Nevertheless the patient sees things horizontally because both these muscles being paralyzed they balance each other.

The left eye has perfect vision, 20/20 plus, equals 0, 5 Snellen at twelve inches and is normal.

The conclusion to be made from the ocular findings is that all of the nerves supplying the right eye are damaged, the oculomotorius being paretic in all but the branches supplying the inferior oblique, levator palpebrae muscles and muscles of accommodation, which are all completely paralyzed, the inferior, internal and superior rectus muscles showing only greatly impaired function. The right optic nerve is paretic and the trochlearis nerve completely paralyzed. The patellar reflexes are normal.

Three and one-half inches above the center of the right zygomatic process the scar of a wound in the skull may be seen. It is about one inch long and but slightly depressed.

There is no facial paralysis and no paralysis of the tongue or palate. Speech is normal. The patient says that the right half of the tongue feels numb to the touch, but he notices slight contact nearly as well as on the left side.

There is decided analgesia, as tested by a pin point, over the entire right side of the face to the median line, over the right temporal region of the scalp and over the right pinna as far as its posterior free border. The analgesic zone stops with striking abruptness on the dorsum of the nose, and in the median line of the chin. There is complete anaesthesia of the integument over the right half of the chin, but everywhere else over the analgesic area he feels the touch of the finger, but not as acutely as on the left side of the face. He called my attention to the fact that when he felt of his ear he had the normal sensation of touch over the back of the pinna, (region supplied by the auricularis magnus nerve derived from the cervical plexus), and that the entire ear in front of this had an unnatural sense of numbness on contact, (region supplied by the auriculo-temporal nerve, branch of the third division of the fifth.)

The faradic current is not felt at all over the affected area but is distinctly noticed on the left side of the face. The sense of smell is not impaired.

Examination of the nasopharynx presents the condition shown in the drawing, a diffuse swelling of the right tubal region which nearly hides the choana, conceals the orifice of the right tuba auditiva and extends into the fossa of Rosenmueller, and on to the dorsum of the soft palate. The catheter enters the tube with some difficulty, but air may be made to enter the tympanum at twenty-two pounds pressure, the sound being dry.

These are the findings. It seems to me that some common cause has injured the right oculomotorius, trochlearis and abducens nerves, and all of the divisions of the right trigeminus. The paresis of the oculomotorius is evidenced by the nearly immobile pupil, the closed eyelid and the limited motions of the globe upward, downward and inward, while the proof of paresis of the abducens lies in the feeble motion of the eyeball outward. The proof of paralysis of the trochlearis and inferior oblique muscles has been made by Dr. Coleman, as described. The interference with the functions of the entire right trigeminus is shown by the widespread paraesthesia, analgesia, spontaneous pain and numbness in the area of its distribution and the weakness of the muscles of mastication of the right half of the jaw. The optic nerve has also not escaped slight damage to its trunk, between the chiasm and eye.

It is justifiable to connect the partial interference with the functions of the nerves mentioned with the diffuse swelling that occupies

the right side of the nasopharynx, and deforms the cartilaginous Eustachian tube. It is difficult to tell whether this swelling be neoplastic or inflammatory infiltration of the granulation tissue order. It has evidently caused the deafness by closure of the lumen of the Eustachian tube to all but strong currents of air.

I regard the swelling seen in the right tubal region as a part of a more extensive infiltration which extends up into the cranial cavity through the openings in the base of the skull, situated at the apex of the pyramid (petrous portion) of the temporal bone. These openings are the carotid canal, the foramen lacerum medium, and the foramen ovale, which transmits the third division of the trigeminus nerve. This division descends close to the outer side of the Eustachian tube, and it is this division which has suffered most injury, as shown by the complete anaesthesia over the right half of the chin, while the other parts of the affected area are merely numb.

In front of and close to the apex of the petrous portion of the temporal bone, lies the cavernous groove for the cavernous sinus, which is created by a folding of the dura mater. In close relation to this sinus, the trunk of the internal carotid artery and each other lie the third, fourth, fifth and sixth cranial nerves, and the optic nerve, so that a common compressing agent might interfere with the functions of all of them. Nevertheless, this compression so far has been moderate, so that some of the nerves are not completely paralyzed.

The aspect of the swelling in the nasopharynx presents nothing characteristic. It forms a diffuse infiltration of the normal parts rather than a distinct tumor, and there seems to be nothing that could be cut off for a microscopic finding. The conditions most likely to come in question are a gummatous, or neoplastic infiltration of the region involved, and it seems probable that the morbid process began in the cranial cavity and is invading the nasopharynx through the openings mentioned in the neighborhood of the tuba auditiva.

The patient's history and the lack of effect of the anti-syphilitic treatment to which he was subjected last winter according to his statement, make lues unlikely as a cause.

Carcinoma sometimes begins as a deep-seated infiltration, and takes a slow course, and it is not impossible that such a condition is developing. The slightly enlarged glands at the angle of the jaw are not large enough to be of value as evidence, however. One of the slow growing types of sarcoma is a more likely condition, though sarcoma in the region involved usually developes rapidly.

I think that time will be needed to disclose the nature of the cause of the singular signs and symptoms of this case, but I shall be greatly indebted to the members of the society for diagnostic suggestions. The treatment I employ has been merely palliative so far. The patient's pain is increasing, and a nerve which was merely paretic two days ago, the branch of the right oculomotor to the levator palpebrae, has now completely lost its function. The motions of the right eyeball are also becoming rapidly more and more limited, and its complete immobility is to be expected soon. The pathologic process therefore, seems to be speedily gaining ground.

34 Washington Street.

Branchial Cleft Cyst—E. R. RUSSELL (Charlotte, N. C.)—*Journ. Eye, Ear and Throat Dis.*, Sept.-Oct., 1904.

A concise and interesting account of a case of abscess of this rarely persistent fœtal condition.

The patient, aged 28, was confined to bed, having been delivered three weeks before, and complained of a very sore throat and chilly sensations. The author on introducing a finger into the post-nasal space, detected fluctuation. On incision with a septum knife, four or five drams of very offensive pus escaped.

It was supposed that this was a retro-pharyngeal abscess; medication was carried out and the cavity kept open by packing with gauze, and then allowed to close. In about two months the abscess had reformed, and was opened, treated and reformed four or five times. General tonics and alteratives were used.

This abscess was located to the left of the median line in the naso-pharynx, and extended in three directions: toward the tonsil; toward the occiput, and toward the cervical vertebræ.

During 1904 Dr. Coakley, of New York, removed some of the tissue from the cavity, and on microscopical examination, decided it was branchial cleft cyst, Drs. Durham, Miles and Stuart concurring. They advised packing with iodoform gauze twice a week in the hope of producing inflammatory reaction. This was done without result, and the patient is now in the same condition as when first seen.

Russell thinks a permanent opening the only relief, as the sac is too extensive to be dissected out. EATON.

THE DISEASED FAUCIAL TONSIL AND ITS OPERATIVE TREATMENT.*

BY WILLIAM R. MURRAY, PH. B., M.D., MINNEAPOLIS, MINN.

The operative treatment of the faucial tonsil is a subject on which a great deal has been written during recent years, and certainly great advances have been made not only toward a better appreciation of the many complications that may arise as a result of the presence of a diseased faucial tonsil, but especially in the operative treatment of the same.

Whatever the function may be of normal tonsillar tissue, and it is still a disputed question, when the gland becomes hypertrophied and the seat of a chronic inflammation, it not only ceases to exist as a functionating organ and to serve any useful purpose in the economy of the body, but, in its diseased condition, with the crypts and cavities filled with decomposing material, and constantly exposed to the presence of pathogenic organisms, it becomes an incubator for the propagation of these microbes, and for the dissemination of their toxins to other portions of the body.

In considering the indications for the extirpation of the diseased tonsil it is only necessary to remind you of the results which may follow the presence of such a diseased gland, and these may be roughly classed as follows:

1. Mechanical obstruction. 2. Recurring attacks of acute or sub-acute inflammation. 3. Extension of the inflammatory process to adjoining structures, thereby causing an acute or chronic congested condition of the same. 4. Acting as receptacles for foreign matter and pathogenic germs which find lodgment in the crypts and cavities of the diseased tissue. 5. The dissemination of these germs by means of the lymphatics or blood vessels and the infection of neighboring or distant organs of the body.

That form of tonsillar hypertrophy which is sufficiently great to cause a mechanical obstruction in the fauces or which is subject to recurrent attacks of acute or sub-acute inflammation, with its attendant train of symptoms, is generally promptly recognized by the profession as operative and its removal advised, but in that form of diseased tonsil termed the submerged tonsil, where the complications

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that may arise are equally serious and equally numerous, the indication for their thorough removal is sometimes overlooked, especially in those cases where there are no acute symptoms referred directly to the tonsils. It is a matter of common observation to find remnants of a diseased gland, remaining after a former tonsillotomy, giving rise to serious trouble, and many cases of submerged diseased tonsils are the remaining portions of hypertrophied glands which at some former time have been partially removed.

It is not my purpose to present to you a detailed review of the numerous investigations which have been carried out and the many clinical cases cited, which have established the great importance which this diseased gland may have as an etiological factor in both local and general infections. In addition to its influence as a causative factor in diseases of the upper respiratory tract and the many reflex disturbances which it may give rise to, there has been an abundance of clinical evidence published showing the diseased faucial tonsil to be the source of infection in such serious complications as tubercular cervical adenitis, septicaemia, pneumonia, gastritis, septic endocarditis, acute articular rheumatism, et cetera.

I would call your attention to the fact that the actual size of the tonsil is but a minor factor in the indications for its removal; that an old tonsillar stump remaining after a former tonsillotomy, is, if subject to inflammation, capable of giving rise to most annoying and often serious complications; that a submerged tonsil is capable of causing as much trouble as a gland that is enlarged to such an extent that it may cause some mechanical obstruction; that the faucial tonsil is situated at the gate-way to the lymphatic chain; that in a case of chronic inflammation of the gland the diseased tissue is likely to extend to the bottom of the gland, and that it is from the deeper portion that the infection is most likely to be carried into the lymph stream and circulation, and when we consider these facts, it would seem that the indication would be clear to remove the entire gland in order not only to relieve the present trouble, but to prevent any recurrence.

In considering the operative methods of removing the faucial tonsil I desire to mention only those procedures which fulfill the indications present in all cases of a diseased tonsil—namely the extirpation of the gland. Personally the use of the guillotine has become with me an obsolete method of operating, removing, as it does, but a portion of the diseased tissue, it leaves the remainder of the gland to give rise at some future time to further trouble, and is

a procedure which has proven, in my experience, to be extremely unsatisfactory.

The particular method to be employed in the extirpation of the gland will depend upon each individual operator, and will also be governed by the indications present in each individual case, but our aim should be to remove the gland by the simplest, quickest and most satisfactory method and the one which is attended by the least danger and inconvenience to the patient.

A method which I formerly advocated for the removal of that form of diseased tonsil termed the submerged tonsil, is the use of the Robertson' tonsil scissors, and while excellent results may be obtained by the use of these instruments I believe that, in the great majority of cases of all forms of hypertrophy, the entire gland can be removed by other methods more quickly, easily and safely and with less inconvenience to the patient.

The method of removing the gland by cautery dissection, is an operative procedure with which I am not sufficiently familiar to warrant my drawing any positive conclusions, but it has always seemed to me that the time required, to thoroughly accomplish the end to be attained, is unnecessarily long, and that in the separating of the eschars, resulting from the extensive cautery work, it might subject the patient to the dangers of hemorrhage and infection. However, I have no doubt that in the hands of Pynchon who has had so much experience in this method of operating, the results are satisfactory.

In mentioning the use of the snare, scissors, knife and traction forceps, a method which I almost universally employ, it is unnecessary for me to go into the details of the operation, and I desire to mention only those steps, the proper performance of which makes the operation simple and thorough, while a failure to observe them will often be followed by unsatisfactory results.

While this method of operating is usually spoken of as tonsilectomy by means of the cold wire snare, the use of this instrument is, especially in the case of embedded tonsils, the least important step of the operation, as the complete removal of the tonsil by means of the snare will depend upon the thoroughness and manner in which all attachments of the gland, to surrounding structures, have been separated before the snare is applied. After drawing the gland forcibly toward the median line by means of the traction forceps, the anterior pillar can be separated by means of the blunt pointed right angled tonsil knife or the right angled tonsil scissors. I prefer the

former as the blade can usually be easily passed well down to the base of the gland and thorough separation made upwards and downwards with less danger of wounding the pillars and causing hemorrhage. After separating the posterior pillar in a similar manner, a point of importance is the thorough separation of the upper portion of the gland at the apex of the tonsillar fossa, and for this purpose I make use of a scissors curved on the flat, and so thoroughly divide all attachments in the supra tonsillar space that the upper part of the gland can be readily turned downwards by traction with the forceps. The bottom of the gland can then be separated in a similar manner by means of the tonsil scissors. After the gland has been encircled with the loop of the snare, the blades of the traction forceps should be separated widely enough to grasp firmly both the upper and lower portions of the tonsil, so that when traction is made both the upper and lower portions of the gland will be drawn well out of the fossa, allowing the wire to slip easily down around the remaining part of the tonsil when it can be readily drawn through and the gland removed.

I usually use a No. 7 piano wire, and without the use of the grooved ring which frequently accompanies a tonsil snare. Such a wire possessing sufficient resiliency to enable one to force it thoroughly down around the base of the gland.

When operating under general anaesthesia, if the operator has difficulty in using the knife or scissors in the left hand, it will be found convenient in removing the left tonsil to stand at the patient's left side in order that he may have the knife, scissors and snare in his right hand, and in removing the right gland to be seated at the head of the table, and thus have the free use of the right hand for the same instruments.

The reaction following this method of operating is somewhat greater than that following the use of the guillotine, the amount of reaction and discomfort varying considerably in different individuals, and is considerably greater in adults than in children.

In regard to the after treatment it is of great importance that the throat should be kept cleansed as thoroughly as possible, by means of sprays, gargles and mouth wash, during the healing process, and that the patient should be kept under observation and treatment for a sufficient period of time to insure thorough and complete healing of the wound. If this is not done the patient will be subjected to the dangers of a secondary hemorrhage. I have had two such cases occur ten days after the operation, from the erosion of a small blood

vessel, and while the bleeding was not alarming, it was very annoying and somewhat terrifying to the patient and family.

Another point of importance in regard to the after treatment, more especially in the case of children, where the operation includes the removal of adenoids, is the advisability of prescribing some form of an iron tonic, as there is a considerable loss of blood accompanying an adenectomy, and moreover, many of these little patients are already anaemic and poorly nourished as a result of the impaired oxygenation of the blood due to defective breathing. I have, in a number of cases, had a blood count made immediately before operating, a second count taken a few hours after the operation, and a third one after a period of four or six weeks, and a comparison of such counts will show a decrease of reds and a leucocytosis on the second count, followed by a rapid increase of reds during the following few weeks.

The choice of an anaesthetic in these cases is a subject of great importance. In the extirpation of a faucial tonsil in an adult, I generally employ local anaesthesia, making thorough applications of a ten per cent. solution of cocain and a 1 to 1000 solution of adrenalin, and I usually precede the use of the cocain by the administration of gr. 1/20 of strych. sulph.

In the case of children, where it is necessary or advisable to use general anaesthesia, our first consideration should be for the welfare of the patient, and that form of anaesthesia should be chosen, which experience has proven to be the safest, provided it meets the requirements of the case, and it should always be born in mind that there is an already existing interference with respiration from the presence of an hypertrophied pharyngeal or faucial tonsil with its encroachment upon the lumen of the air passages.

The use of the more transient anaesthetics such as nitrous oxide and ethyl bromide produce an anaesthesia of too short a duration to be satisfactory in this method of operating, and our choice will be limited to the use of chloroform or ether or both.

In the absence of contra indications such as bronchitis, nephritis, etc., and with the proper care of the patient and avoidance of exposure, after the operation, I believe it is the consensus of opinion among operators that the margin of safety is considerably greater in the administration of ether than in the use of chloroform, and this is especially true in this class of cases, where there is an interference with respiration from the presence of a naso-pharyngeal obstruction.

A second point, in favor of ether, is the possibility of obtaining a longer period of anaesthesia, if the anaesthetic has been pushed to deep narcosis, a point of considerable importance in operations on the upper air passages, where the anaesthetist and the surgeon occupy the same field of operation, and the former is compelled to suspend the administration of his anaesthetic in order not to interfere with the work of the latter.

602 Nicollet Ave.

Report of Cases Simulating Grave Mastoiditis—FRED. BAKER (San Diego, Cal.) *South. Calif. Pract.*, Los Angeles, Feb. 1905.

The three cases cited by Baker convey needed information to over-zealous mastoid operators. The first was in a male of 19, who, ten days after an attack of "grippe" with chills and high fever, on attempting work had a severe attack of ear ache with rupture of the right drum head.

When seen, there was a large opening in the lower anterior portion of the drum from which came a very free discharge; temperature 101.2° F. There was some dizziness, and very severe pain in the ear and mastoid. The mastoid region was swollen, somewhat boggy to the touch, and both pressure and percussion increased the pain. At midnight there was a severe chill followed by high fever which had subsided gradually.

A large number of "grip" cases without complication of the mastoid, when purulent otitis existed, had made Baker willing to take some chances. He therefore began palliative treatment. The following night there was a chill like that of ague, and temperature of 105.5; chill and temperature quickly controled. A blood count was now made, and showed a trifle less than 9,000 white corpuscles to cu. m.m., and it was concluded that there was no streptococcic infection to account for the chills, and that the count gave rather positive indications against serious mastoid invasion. Two days after first seeing patient, the case turned out to be a typical case of typhoid fever.

Another case was one of walking typhoid in a boy of seven with mastoid swelling and tenderness; while the third case followed upon the latter part of an attack of chicken-pox in a girl of 13; there was fever and with pain and tenderness of the mastoid. An operation was favored by two aurists, but the case recovered with perfect hearing.

Baker closes by stating that: "These cases have been reported to show that the last word has not been said about suppurative otitis by those aural surgeons who maintain that all patients must be operated upon where mastoid pain of severe character persists over thirty-six hours, if accompanied by high temperature, and especially if there are chills of apparent septic character." EATON.

FORMALIN IN THE TREATMENT OF DISEASES OF THE EAR, NOSE AND THROAT.*

BY OTTO J. STEIN, M.D., CHICAGO, ILL.

In presenting this subject it is unnecessary for the purpose of the paper to enter into the chemistry or the physiological properties of the drug.

Formalin has already won well-merited recognition as a powerful germicide, disinfectant, deodorant and antizymotic. Its most valuable qualification is that it is so actively germicidal in such infinitesimal dilutions, and as such is harmless to the vitality of the cells. The power of its antiseptic properties, its effectiveness in very dilute solutions, the simplicity of its application, its ready solubility, its cheapness and its comparative harmless nature have indorsed its wide employment. It is a preparation readily procurable anywhere; can be kept for a long time without deterioration; in proper dilutions is almost painless and odorless, and is not injurious to fine fabric or to instruments.

I was first led to employ this drug in a case of long standing muco-purulent discharge of the ear, and was so pleased with the immediate results obtained that I began using it in a variety of ear affections. It demonstrated its worth as a drug to prevent the growth of and as a power to destroy bacilli. As a means to prevent the development of the bacteria of putrefaction, and to prevent the growth of the various parasitic growths found within the auditory canal, in otomycosis, it has no equal. Most gratifying results will be obtained when used to check the foul odor existing in many cases of chronic suppurative ear disease.

From the results obtained in the treatment of certain affections of the respiratory passages, we have ample proof of its effectiveness as an antiseptic. Excellent results have been secured in the treatment of whooping cough and pulmonary tuberculosis, but I have had no personal experience with it in either of them. In the anginas accompanying the various exanthemata, and in diphtheria its employment is apparent. In tubercular laryngeal disease it is to-day one of the best means we possess for treating this affection. Personally I have used it in the various manifestations of the disease

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many times, and the conclusions I have arrived at after this experience warmly endorses its employment in such affections. It has been recommended in the infiltration stage of the disease by direct injection into the infiltrated area. I have not used it in this way. But in the ulcerative stage it certainly exerts most promising results. It is my practice to first cleanse the ulcers, then spray a ten per cent cocain solution into the larynx, to be followed in five or ten minutes with a cotton applicator well moistened with a five to ten per cent solution of formalin in water. The previous application of the cocain robs the patient of any smarting otherwise present as a result of the formalin. The treatments are repeated two or three times a week, and never result in any unpleasant symptoms. Many different combinations of formalin are used, but my method is to dilute with water. A solution suggested by Lake has proven successful in some hands. It is composed of carbolic acid, ten parts, formalin ten parts; lactic acid, fifty parts, and water thirty parts. Paraform, a powdered form of formalin, can also be used.

Formalin may be incorporated in mouth wash and gargle solutions in the strength of one half per cent. In the lacunar type of tonsil disease it can be used in from two to five per cent solutions. A one to two per cent solution can be used in the various manifestations of nasal disease, like tubercular and syphilitic ulcerations, atrophic rhinitis with ozena and in suppurative sinuitis. It is advisable in all such cases to first clean the affected surface, and then apply a two or four per cent cocain or eucain solution, in order to obviate the pungent effect of the formalin. In vaso-motor rhinitis Ballenger incorporates the cocain with the formalin as follows: Formalin, one-half per cent; cocain, two per cent; and he then makes but one application with a spray.

Formalin, in solution with water or alcohol, used by injection into malignant growths and inoperable tumors about the nose, throat and naso-pharynx, has been reported used with success. I have never used it in this way. We have used this drug in a great number and variety of cases, but not wishing to trespass too far on valuable time, perhaps the recitation of a few cases will convey an idea of the broad field of application, the rapidity of action and the beneficial effects obtained from the employment of this drug in affections of the ear, nose and throat.

Mr. B. Otomycosis. From the history given by the patient he had been under the treatment of a Chicago confrere off and on for six months. Examination of the ear showed pieces of soft masses,

in part desquamated epidermis, of a dirty white color, and other masses of a white color covered in places with black particles. On the posterior part of the drum membrane was one small phlyctena. After opening the phlyctena and cleaning and drying the canal thoroughly, a narrow strip of plain gauze was inserted, filling the entire canal loosely. On the outside of this two drops of a ten per cent formalin solution was dropped, a piece of dry cotton fitted into the meatus, and the latter then sealed with collodion. On the second day this dressing was removed, and the improvement was so great as to make further application of the formalin unnecessary. Within a week this case was dismissed, and when seen four months later there was no sign of a recurrence.

In this case the conditions present responded exceptionally quick to the treatment. It is more often necessary to repeat the application two, three or four times, at intervals of two days.

Where the skin of the canal is very delicate or already inflamed from the discharge present, or where either too strong or too much of the formalin solution has been used in moistening the outer end of the gauze, a slight irritation of the skin around the meatus may occur, but otherwise nothing unpleasant results.

Miss Helene B., 25 years old; Chronic suppurative otitis media, bilateral, since childhood. The right drum membrane entirely destroyed, and in the left a large central perforation. After treating the condition present, including the removal of some adenoid tissue, and an ossiculectomy of the right ear, there still existed a slight discharge. Five applications of a five per cent solution of formalin, at intervals of four days, resulted in a cessation of the discharge, and there has been no return after eleven months. Where the perforation is very large, as in this case, the formalin solution is instilled directly into the ear, and left there for five minutes. After which the parts are thoroughly dried and plain dry sterile gauze inserted. Some patients complain of a sharp pain lasting not more than one or two minutes after the formalin application. In such cases I may precede the treatment by the instillation of one drop of a warm ten per cent cocain solution.

Helen M., 15 years old. Chronic mucopurulent middle ear disease. The history of an intermitting discharging ear in this case extended back to childhood. The secretion was chiefly mucus, very copious, and had its origin from attacks of Eustachian salpingitis, which in turn was provoked by a general lymphoid thickening about the oro and nasopharynx. Formalin was used in this case, after trying

many of the well known drugs, with the idea that possibly an astringent effect might be obtained. Applications were made with a intratympanic syringe, half full, directly into the cavum tympanum, the fluid coming out through the tube into the throat. At first a two and a half per cent solution was used, but this proved too painful to the patient, who is over sensitive, and I reduced it to a one and one-fourth per cent solution. After the second application all discharge ceased but appeared again, in very slight amount, within a week, but which in turn was checked by two more injections.

Mr. R. D., 35 years old. Chronic suppurative otitis media of left ear for five years; cholesteatoma in middle ear, and a most offensive odor to the profuse discharge. This case was one for surgical intervention, but consent could not be obtained, and therefore the treatment necessarily was only one of cleansing. A formalin solution of five per cent, and often ten per cent, was used, which readily changed the character of the secretion to a watery nature, reducing it in amount so that only a very little collected in the period of three or four days, and the odor was absolutely dissipated. With a reduction of the discharge to the minimum, so that the hearing improved, and the sense of heaviness disappeared; with a total absence of any odor and with the spirits of the patient immensely improved, the instillation of formalin in this case brought about as good results as I expected.

Dr. Joseph Mullen of Houston, Texas, drew my attention to the employment of formalin in a manner quite novel and entirely new to me. Since reading his report upon its method of application I have followed his directions in four cases with entire satisfaction. The method of using it in septic mastoid cases is as follows. The formalin, full strength, is dropped on the outside of the dressings, on a spot marked with an indelible pencil indicating the location of the external meatus. The nurse is instructed to drop about twenty drops of the solution on the dressings three times a day. After removal of the dressings on the fifth or sixth day the wound looks clean and healthy; there is an absence of pus and foul odor and as a consequence the temperature remains near the normal. That the influence of the drug is felt is readily determined by the strong odor of formaldehyde gas that permeates all the dressings down to the middle ear cavity.

Mr. R. T.; 37 years old. Laryngeal tuberculosis in which the first laryngeal symptom, that of hoarseness, manifested itself six years ago. The pulmonary changes have not advanced much. The cough is severe; expectoration difficult; swallowing painful, and the

hoarseness very pronounced. The sputum showed quantities of tubercle bacilli. Both vocal cords presented ulcerations on their upper surface involving the posterior half or more, and was associated with some edematous infiltration. At first a two and a half per cent solution of formalin was applied directly to the ulcerations. After a week a five per cent solution and in another week a ten per cent solution was used. After five weeks, a fifteen per cent solution was applied every fifth or seventh day. The patient was under observation for three and a half months, and showed a steady improvement in his condition, both local and general. The cough occurs only at long intervals, is easy and not in the least exhausting. His appetite is splendid and there is no discomfort whatsoever when eating or talking.

100 State Street.

Closure of the Ostium Maxillare.—JOHANNES MARTIN.—*Monatsschr. f. Ohrenh.*, Berlin, February, 1905.

Three cases of antrum disease are reported, which healed rapidly after puncture through the lower meatus, and irrigation. In all the cases considerable pressure was required to start the flow of fluid through the antrum, showing that there was some obstruction at the ostium. The author believes that there are many cases in which, during an acute rhinitis, the natural orifice of the antrum becomes obstructed through swelling of the mucous membrane. The veins of the antrum leave the latter through the natural opening. Hence, when obstruction occurs at this point, a venous stasis takes place in the antrum, resulting in swelling and oedema of its lining membrane. In this way the obstruction is kept up, and the antrum becomes filled with secretion. The rapid cure after puncture is thus easily explained.

THE CLINICAL SIGNIFICANCE OF OTALGIA.*

BY PERCY FRIDENBERG, M.D., NEW YORK.

Elevation of body temperature, local signs of inflammation, and pain, more or less severe, are the cardinal symptoms of acute otitic disease. Of these, ear-ache, while frequently the immediate determining cause in the invocation of medical aid, and perhaps the most striking and significant aural symptom, is also the most variable, difficult of interpretation and misleading. This is due to a number of factors. The subjective character of pain, renders it difficult of registration and measurement and hence of record and comparative study, besides introducing the element of individual susceptibility as a personal equation of the patient into our calculation. Aggravation, on the one hand, dissimulation, through fear of operation on the other, are the Scylla and Charybdis between which the surgeon must steer his diagnostic bark. A morbid change in the personality of the patient incidental to stupor or phlegmatic mentality in the adult, or to high fever, delirium or fright in children, still further complicates our task, so that actual pain may be overlooked, or, again, be erroneously inferred when absent or negligible.

It is not this element to which I desire to call your attention, as similar factors of personality and judgment, of individualization, enter into many questions of diagnosis and are the test of the common sense and perspicacity of the surgeon rather than of his technical skill and special knowledge. The factors which are to form the basis of my remarks on otalgia and its significance in diagnosis are of an anatomical and clinical (physiological) rather than of a psychical nature, and at the outset of our study two important facts present themselves.

First, that aural pain has a markedly varying significance, according as it is autogenous, direct, or transmitted, reflex. And here, as in the factor just cited, we have a double significance, and a two-fold application. Pain at a distance may indicate aural disease, and aural pain may be a symptom of disease in distant organs. A brief recapitulation of the innervation of the organ of hearing and of the reflex arcs connected with it, may be in order. The external aspect of the concha, the anterior and superior canal wall,

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and the outer surface of the drum-membrane are supplied by the auriculo-temporal nerve, a branch of the third (inferior maxillary) division of the trigeminus. The convex surface of the concha and the integument of the mastoid are innervated by the auricularis magnus from the superficial cervical plexus; the posterior canal wall (and, according to Gray, the integument at the back part of the pinna) by the auricular branch (Arnold's) of the pneumogastric which anastomoses with the facial directly and with the posterior auricular branch of the same nerve. The sensory nerves of the middle ear and Eustachian tube are filaments from the tympanic plexus formed of the tympanic branch (Jacobson's nerve) from the petrous ganglion of the glosso-pharyngeal, the small petrosal from the otic ganglion of the trigeminus, and several branches from the carotid plexus of the sympathetic.

This complex innervation supplies the possibility of irradiation of pain to, and reflex irritation from anastomosing branches of the vagus, sympathetic, trigeminus[1], glosso-pharyngeal and superior cervical sympathetic plexus. Thus the auricularis magnus also supplies the parotid and the integument over the occipito-frontalis muscle; the auriculo-temporal, by its branches to the facial, supplies the articulation of the jaw; the posterior auricular terminates in the integument of the occipito-temporal region; the spreading of ear-pain to the temples, vertex, occiput jaw, teeth, and shoulder is thus explained. More distant structures are also connected. The principal regions thus concerned are the commencement of the digestive tract, buccal cavity and pharynx, supplied by the second and third division of the trigeminus.

The teeth are frequently the point of origin of reflex ear pain either by reason of carious roots, periostitis or other inflammatory processes, or by mechanical irritation such as that coincident with difficult dentition or the irruption of a wisdom tooth[2]. Small ulcerations of the hard palate, mucous membrane lining the cheek or the tongue, may cause similar reflexes and in the case of carcinoma of the tongue, otalgia has been observed as one of the earliest symptoms. Aural disturbances may be reflected from the nasal cavities. Makuen (LARYNGOSCOPE, July, 1904), reports having a somewhat painful proof of this fact some years ago in his own

1. Tumors of the brain or Gasserian ganglion, disease in any part of the fifth nerve, a trigeminal neuralgia, may all occasion ear-ache.

2. While the reflex dental origin of the ear-ache is usually recognized promptly by a negative finding in the ear, it may be obscured in very young children and infants by the mechanical difficulties attending a satisfactory and conclusive otoscopic examination. This difficulty is not fully appreciated, even by the profession. The skillful, patient and persistent employment of every technical resource, and even the administration of a general anaesthetic, may be rendered futile by the extremely small field or by the formation of a necrotic layer upon the drum, or the accumulation of debris over it.

person. A unilateral intranasal pressure caused, among other things, distressing sensations in the ear of the affected side, occasionally attended by dizziness, all of which symptoms were promptly and permanently corrected by the removal of a septal spur. Several similar cases occurring in this author's practice have convinced him that vertigo should be included among the possible nasal neuroses.

In chronic abscess of the tongue, which may simulate dermoid or simple cyst, there may be intense ear-ache persisting in spite of narcotics, and giving rise to extreme suffering and anxiety on the part of the patient, and to grave concern on the part of the physician. There may be absolutely no spontaneous or superficial tenderness in the part of the tongue affected. Richardson (J. Am. Med. Ass'n, Feb. 26, 1898), reports a most interesting observation of this kind in a young girl of eighteen. There was intense and persistent ear-ache, unrelieved by 1/4 gr. of morphine by hypodermic, suggesting the presence of acute otitis, but repeated aural examinations failed to reveal any abnomality of the canal or drum, and hearing was unaffected. While examining the patient's pharynx, the happy idea occurred to Richardson that the mass at the base of the tongue might be the cause of all the trouble, although appearing perfectly benign. (This mass had been present since early childhood, and had never caused any inconvenience). On compressing the growth the patient gave evidence of most intense pain. Incision, curettage and packing of the abscess cavity brought immediate relief of the symptoms. There was no change of the tissues over or about the seat of the abscess. It was only when firm and great pressure was exerted that any evidence of pain was demonstrated.

The ear-ache of tonsilitis, of diphtheritic angina and that following intra-nasal operations and removal of adenoid hypertrophies, are well-known and require but passing mention. That tubercular or syphilitic ulceration of the naso-pharynx may cause similar symptoms is not so well known and acquires practical importance from the fact that these lesions may easily be overlooked in direct inspection of the pharynx and are to be discovered only by posterior rhinoscopy. Conversely, pain in the throat and obstinate cough, may appear as reflex manifestations of aural irritation, slight in itself, particularly that of the drum or external canal, such as is caused by the presence of foreign bodies, impacted cerumen, applications, the contact of a probe with the tympanic membrane or

even the introduction of a cold speculum.[3] The entrance to the larynx, epiglottis and arytenoids, supplied by the superior laryngeal from the vagus, are also affected by this reflex, as well as being concerned in attacks of otalgia, when ulcerated, (*e. g.* in tuberculosis). The parotid and the temporo-maxillary articulation finally may be affected (as in mumps or monarticular rheumatism) and give symptoms which are referred to the ear.

The localization of true aural pain is itself very inexact at least as concerns all but the most superficial regions. While the patients' statements may be precise as to pain over the mastoid area, the pinna, or the canal wall, the description is very vague in regard to the drum, tympanic cavity, Eustachian tube and pneumatic spaces, and is generally summed up in the complaint of pain deep down in the ear or inside the head. The character of the pain is but little more conclusive, for while throbbing, beating pain of a continuous character speaks for an inflammatory process, and lancinating pains with free intervals for neuralgic affection or reflex irritation, these inferences are to be drawn with great caution and not always to be relied upon. While the results of careful inspection and clinical examination in its widest and fullest sense are always to have the first consideration, there are undoubtedly peculiarities in the subjective symptoms which may prove valuable diagnostic aids. In inflammatory affections of the external canal, particularly in those of a circumscribed character, pain is a constant symptom. In furuncle it is generally acute, can be fairly accurately located, and is limited to a small area which can be most easily determined by delicate probing with a cotton wound applicator. It is more frequently, if less artistically, discovered by the intense pain that is caused on the introduction of an ear speculum. It is increased by manipulation of the pinna, especially by traction on the posterior wall, less frequently by pressure on the tragus, or spontaneously in moving the jaw or chewing, and not at all by sneezing, coughing or blowing the nose. It is generally relieved

3. The irritation of a foreign body or of impacted cerumen may cause not only severe radiating pain and intense headache of a hemicranial character, but nervous reflexes as well, such as obstinate salivation (Power), spasmodic cough, chorea, epileptic and eclamptic convulsions, loss of consciousness, meningeal irritation, vomiting, decreased pulse rate and psychical disturbances, amnesia, confusion of ideas; and Kirkendall (Section on Ophthalmology, Am. Med. Assn., July 1905) reports a case of obstinate muscular asthenopia with insufficiency of convergence due to this cause, which had been under the care of several prominent oculists, and was promptly cured by the removal of a plug of wax from the ear. Vertigo, nausea and vomiting, as well as syncope and convulsion have not infrequently been observed after minor operations (paracentesis, curettage of middle-ear, incision of furuncle) and even after such comparatively innocent procedures as politzerization and syringing-out the ear.

In affections of the chorda tympani nerve, which not infrequently complicate acute or chronic middle-ear inflammation, reflex stabbing pain may be felt at the edge of the tongue, radiating from the middle to the tip.

promptly by incision. As hearing is not affected unless the inflammatory reaction be so intense as to occlude the lumen of the canal completely, the diagnosis is usually free from difficulty. There are exceptions, however, and in these cases some time may elapse before the picture becomes clearly developed. Thus, in the very earliest stage of a furuncle there may be diffuse pain without marked local swelling, and irradiation into the teeth, temple, neck, or occiput. A deep-seated furuncle of the posterior canal wall may cause periostitis with doughy swelling at the posterior attachment of the pinna sufficient to obliterate the sulcus between it and the mastoid region and so arouse suspicion of grave disease. Dimunition of hearing due to impacted cerumen or to previous ear disease must also be borne in mind, as also, finally, the possibility of a complication of furunculosis by an actual otitis media or mastoiditis. Decision as to this point may be very perplexing when, as occasionally happens, the furuncle is caused by infection of hair follicles in the canal due to the discharge from a running ear.

Acute inflammation of the middle-ear whether serous or purulent is almost invariably attended with pain. At first this is apt to be intermittent and not severe, coming on at night,[4] lasting for an hour or two and disappearing spontaneously; or, after the application of heat or of some household remedy. It is generally deep-seated, boring or throbbing and diffuse, and may be accompanied by general headache. The free intervals tend to become shorter, and the pain is increased on lying down as well as on any increase of intra-tympanic pressure as in politzerization or catheterization in swallowing, coughing, blowing the nose; so that these acts are anxiously avoided and dreaded by the patients. Manipulation of the ear has no effect upon the pain, which is due to pressure on and tension of the inflamed drum. Its degree varies and is dependent on the amount and character of the fluid in the tympanic cavity, the resistance of the drum membrane, and perhaps on individual peculiarities. In children the pain is frequently of short duration, slight or absent. The retained fluid becomes purulent more quickly than in adults on account of the shorter and wider communication with the naso-pharynx, perforation takes place sooner and even before this, the drum, being thinner and laxer, yields more easily to pressure.

4. Most earaches occur at night. McAuliffe (Trans. Am. Otol. Soc. 1903) ascribes this to the dorsal decubitus in which tubal drainage and the circulatory balance of the ear are theoretically not as good as in the erect posture and advises for aural patients a semi-reclining attitude with the helix of the affected ear uppermost to give forward and downward drainage.

Aside from spontaneous complaints of the little sufferers the most generally observed manifestations of earache are twisting or tossing of the head, burrowing into the bedclothes, ear-tugging, boring the finger into the canal, pain on manipulation of the ear, disinclination to rest head on affected side. Not infrequently general restlessness, crying out in disturbed sleep, peevishness, refusal of nourishment, may be the only indications of suffering, and Halsted (Jour. Med. Soc., S. N. Y., Jan. 30, 1900), and, more recently, Kerley (N. Y. Med. Jour., July 8, 1905), have drawn attention to the fact that in a large percentage of cases of acute otitis media there was no pain at all.

The most interesting clinical feature in Kerley's study was the absence of pain or localized signs by manipulation in fifty of the cases, or sixty-nine per cent. Among the pain group are included those who were very restless, who slept poorly, those who evidenced any great discomfort. Upon discovering the ear disease and noting the relief which followed incision of the drum membrane, it was fair to assume that the source of discomfort rested in the ear. Had it been left for the usual signs of pain or tenderness of the parts, in fifty of the cases a diagnosis of otitis would not have been made when it was. Six were seen in consultation because of the unexplained, continued fever. Nine had been treated by other physicians. In none of these had ear involvement been suspected, because of the absence of pain and localized signs.

While juvenile otitis may exist without pain, pain rarely exists without otitis. The belief so common among the laity and, unfortunately, to some extent also in the profession, that earache in children is ordinarily neuralgic cannot be too energetically combatted. The frequent, evanescent aural pain of childhood is suggestive of Eustachian obstruction, due to adenoids with retention of catarrhal secretion in the tympanic cavity.

Pain recurring some time after the subsidence of acute symptoms of otitis media, especially when attended by sudden cessation of discharge, is generally a danger signal, indicating insufficient drainage or progressive involvement of bony structures. It is of even greater significance in chronic otitis which is generally painless until complications develop, such as mastoid suppuration or intra-cranial disease. Otitis running a subacute course from the start, with comparatively little pain, should arouse suspicion of tuberculosis.

With the extension of an inflammatory process to the mastoid antrum and cells, pain may be spontaneous or elicited only on

pressure. Leaving out of consideration the local signs of purulent bone involvement, such as the typical fundus changes, mastoid or cervical oedema, and the systemic symptoms, all of which combine to form a well-known picture, let us consider the character of the mastoid tenderness; and, first of all, certain sources of error in its determination and interpretation.

The pressure should be made with the ball of the thumb, carefully avoiding the use of the nail, while standing in front of the patient so as to observe the facial expression which is often more enlightening than any statement. At the same time pressure should be exerted on the opposite mastoid for comparison. It should be gradual at first, and the entire apophysis palpated from above the level of the pinna down to the very tip of the mastoid and still further if there appears to be any tenderness in the neck. Care must be taken to avoid pressing on the auricle or fibro-cartilage of the meatus. Three points should then have our particular attention. The region of the antrum directly back of the upper canal wall, the tip, and the region of the mastoid emissary vein, about 1 1/2 inches back of the lower border of the meatus. A shifting of the point of greatest tenderness from one of these localities to another is often of great significance. Superficial inflammation, such as dermatitis or a mild periostitis, may confuse us. A gland is often found on the mastoid plane which, even under normal conditions is tender, and when inflamed may be so exquisitely and persistently painful as to simulate mastoiditis (McKernon). This should be pushed to one side or avoided altogether in palpating, if we are not to be led astray. A leechbite or an infected hair follicle may in a similar manner prove a pitfall for the careless examiner.

The cardinal symptom of acute mastoiditis is the invariable local tenderness over the antrum which is situated directly back of the attachment of the concha at the level of the external meatus at a depth varying according to the greater or less development of the cortex. In chronic disease tenderness may be entirely absent.

Tenderness in front of and slightly above the ear is rare, and when due to otitis, is indicative of extension of a purulent process to the cells in the zygoma. Infra-auricular and lateral cervical pressure pain may be due to tonsilitis, inflamed cervical glands, rarely to affections of the cervical vertebrae, or when genuinely otitic with tenderness on deep pressure over the tip, to jugular thrombosis or to a perforation of the vaginal process, and purulent infiltration of the deeper muscles and fasciae of the neck (Bezold mastoiditis). Where either of these complications is suspected

manipulation should be extremely delicate, and as brief as possible. Here attention should be drawn to the fact that pain is normally caused by pressure immediately below the ear and just behind the glenoid fossa, and is referable to the Eustachian tube (Dench). To avoid this source of error, pressure on the tip should be made backward or from below upward. Post-mastoid tenderness, particularly if limited to the region of the mastoid emissary vein is an important symptom of sinus thrombosis or at least of the formation of an extra-dural, peri-sinuous abscess. Post-operative mastoid pain is generally slight. Marked or persistent discomfort should arouse suspicion and lead to a careful revision of the dressing, and if necessary of the operative field. Constriction by the bandage, infective cellulitis, stitch-hole abscess, retention of secretion, tight packing, are the common causes. Progressive involvement of neighboring structures due to incomplete operation or intra-cranial complications are fortunately rarer. The character of the pain in these grave cerebral affections forms a chapter of great diagnostic importance, which is, however, outside the scope of the present paper.

In a certain class of cases no organic basis for otalgia can be found, and the affection is classed among the neuralgias. Among the etiological factors of this comparatively uncommon form we have loud noise, colds, rheumatism, hysteria, neurasthenia, anaemia, malaria, diabetes, syphilis, various toxic disturbances, notably chronic lead poisoning, and finally sexual disorders, menstrual anomalies, pregnancy, the puerperium and the climacteric state, or it may be due to extreme cold (Urbantschitsch) or measles (Blau). Hysterical mastoid neuralgia may be severe and obstinate. The differential diagnosis is rarely attended with difficulties, except that severe intermittent mastoid pain is occasionally observed after spontaneous or operative cure of chronic otitis media, probably as a result of sclerosis and eburnization of the bone, and consequent compression of nerve filaments in the mucous membrane lining the pneumatic cells. Neuralgia of the concha may be accompanied by an eruption of herpes vesicles (Auriculo-temporal nerve). The external canal may be affected in neuralgia of this nerve or of the trigeminus. Tympanic neuralgia is occasionally observed.

114 W. 126th St.

A CASE OF EPIDURAL ABSCESS OF THE TEMPORAL REGION AND ABSCESS OF THE FRONTAL LOBE. OPERATION. RECOVERY.

BY GOTTLIEB KIAER, M.D., COPENHAGEN, DENMARK.

H. Shoemaker, fifty-three years old, always healthy until February, 1904, after a slight passing cold, was seized suddenly by a violent pain in his left ear, with constant whistling which ceased in two weeks. The pain, however, persisted. It was of a steady, pressing, squeezing character, sometimes throbbing. The severity varied, at times becoming so great that the patient would cry out. Once in an especially violent seizure, he fainted. There was no dizziness or spasm, but with the sudden exacerbations, he complained of soreness in the neck and difficulty in turning his head. In the course of three or four weeks these attacks declined.

A month after the onset of the illness, the ear began to discharge, and at the same time the pain decreased, but remained as prickling feelings in the brow and temple on the left side. Occasionally the discharge stopped, when the pain immediately increased as at first.

During the fifth month of the illness a new symptom appeared, namely, drowsiness, which persisted and was occasionally accompanied by slight chills. During the whole time the patient felt feeble and tired, with disinclination to work. He was emaciated, but his digestion was not disturbed, and his bowels were regular.

The patient applied to the writer on August 23, 1904. He seemed to be in great pain, with pale, grayish face. By otoscopy, pus was seen in the left auditory passage, and removed. The membrana tympani appeared slightly opaque with injection of vessels along manubrium. There was no perforation or scar. The pus oozed out through a fistula in the upper posterior part of the external auditory canal, a little external to the membrana. The opening of the fistulous tract was surrounded by a few small granulations. A probe introduced passed through in the direction of the antrum mastoideum. The temporal and mastoid regions appeared normal, and were not tender on percussion; pupils equal, re-acting to light; sight normal; no paresis or disturbance of sensibility. The reflexes were normal; pulse 80, vigorous regular; urine, acid, clear, free from albumen and sugar; no disturbance of speech.

The day after, August 24th, I operated upon the mastoid under ether narcosis at St. Josef's Hospital. After chiseling through 1 cm. of eburnated bone I entered the antrum, to find it full of pus with swollen mucosa. As it was not possible to discover any fistula, the wound was packed with Iodoform gauze and dressed. On the morning of the day following, temperature was 36.9° C., but the evening temperature was 39.9° C., with pulse of 120 and chills. On removing the packing, a single drop of pus was seen trickling from a very fine fistulous opening in the most posterior part of the tegmen antri.

August 26th. Under ether narcosis, the mastoid wound was extended upward and an epidural abscess as large as a hen's egg was evacuated. The pus was yellow and creamy, but not foul smelling. The dura was depressed, especially in the direction of the middle cranial fossa. Here it was of a dirty gray color, feebly pulsating. The posterior wall of the abscess cavity, corresponding to the posterior cranial fossa, pulsated markedly and the dura was more swollen and covered with granulations. The bone was removed in almost the whole extent of the abscess. The wound was packed and dressed. The next day, the temperature was normal; and during the subsequent course of the illness, no rise of temperature occurred. On the second day, following the operation, the

dura was found to have gained its natural color and pulsation. The general condition of the patient improved considerably in a very short time, and he "felt like a new man." At the daily dressing, there was observed a considerable secretion of pus, which came chiefly from the posterior part of the cavity of the wound, from which part a large amount of a thin, purulent liquid escaped occasionally.

August 31. Under ether narcosis, the trephine opening was much enlarged, and a tubular extension was made backward, about 4 cm. The dura was found spongy and swollen, with a single black necrotic spot. Everywhere pulsation was felt. The large gaping wound in front was brought together by two sutures and dressed. After the operation, the patient was rather weak; but he regained his sertngth very quickly, so that after two days he again felt perfectly well. The pulse varied between sixty-eight and seventy-two, and did not rise after the evacuation of the large epidural abscess. The temperature remained normal except for the rise after the first operation. Urine normal. Ophthalmoscopy revealed nothing abnormal. (Prof. Edm. Jensen.)

During my absence in October, Prof. Schmiegelow was kind enough to dress the patient. He was discharged November 3, with the wound completely healed, except for a fistula located well posteriorly from which there was some discharge.

December 21st. The flow of pus continued unchanged, and as the skin above the tubular resection opening had become infiltrated, a sequestrum was supposed to lie here.

December 24th. Under ether narcosis, a square flap incision was made through the scalp, with attachment superior and inferior edge corresponding to the cicatrix. The flap was raised and a large quantity of pus flowed out. The dura here was spongy and swollen, with isolated spots of necrosis. The sequestrum was not seen immediately as it lay completely wrapped up in the skin flap, surrounded by a firm web. Only its black, discolored point was freely visible. It was removed and wound packed and dressed.

December 27th. Pus was abundant. The wound showed fresh granulations. A drop of pus appeared on the granulations on the dura, similar to the pus seen at the operation; but by careful probing nothing was discovered. Temperature was normal.

January 7th, 1905. Patient felt entirely well except for slight pressure in anterior part of temporal region. Pulse 70. A slight amount of pus trickled out steadily between the granulations at

anterior edge of the wound. The granulations were scraped away, and the flow of pus became more abundant. Further probing was attempted and the probe was introduced between the dura and bone about 8 cm. A large quantity of pus escaped and pulsation was noted. Streptococci were found in pus. The urine, normal; ophthalmoscopic examination, negative.

January 9th. Under ether narcosis, in the frontal region, a tubular opening 1 cm. broad by 6 cm. long was chiseled in the bone. The dura was very oedematous with dark discolored surface. Well forward there was seen a little opening that led to an abscess cavity as large as a pigeon's egg. The opening was extended, and by rather strong pressure a very large amount of thick pus was expressed. The cavity was explored by a probe which passed forward a distance of 3 cm. The part of the dura, that lay in front of the perforated opening, was of normal appearance. The thickened skin flaps were thinned and sutured posteriorly. The abscess cavity was packed with iodoform gauze and the wound dressed.

January 13th. The temperature remained constantly normal.

January 23rd. Patient discharged from hospital.

At the end of February the wound had healed.

April 4th. Patient feels well, but wears a padded leather plate for safety. As shown by the photograph, there is a scar on the left side 12 cm. long beginning a little behind the anterior part of the linea semicircularis, extending posteriorly in a curved line with convexity downward. The scar lies about 5 cm. superior to the external auditory meatus; 2 cm. above and somewhat posterior to the auditory meatus there is a depressed round scar about 1.5 cm. in diameter. This is connected above with the curvilinear scar by a scar 2 cm. long and below with the scar on the processus mastoideus. From the posterior part of the curvilinear scar a 4 cm. line extends upward and forward.

Dr. C. Riis and Dr. Brünnich-Nielsen very kindly assisted me in the operations. The patient was presented before the Otologic Union, April 29, 1905.

The points requiring particular stress in this history are the sudden beginning of the illness, after a slight cold, with severe pain in the left ear, continuous, but of variable severity; and the absence of vomiting except once during a severe paroxysm of pain.

In spite of careful otoscopy nothing abnormal was discovered either in the auditory passage or in the membrana tympani, so that,

as he also complained of soreness in the neck together with difficulty in turning his head, the case was considered one of rheumatic neuralgia. Only a month after the beginning of the illness the purulent discharge appeared with cessation of pain which began again when the discharge stopped for a time.

In the fifth month a new symptom appeared, namely, drowsiness now and then accompanied by slight chills. The patient grew thin, felt tired and faint, but there was no disturbance of digestion. Not till six and one-half months after the beginning of the illness did the patient apply to the writer. He was evidently in pain. He answered all questions distinctly and clearly. The membrana tympani was almost normal in appearance and had no scars. There was a discharge through a fistula in the bony portion of the external auditory canal, which led into the antrum mastoideum; the temporal and mastoid region shows nothing abnormal. Pulse 80 regular and strong.

The antrum was opened by the Schwartze method; and two days later, an epidural abscess as large as a goose's egg was evacuated. This abscess was connected with the antrum by a fistula in the roof of the antrum. The drowsiness and emaciation of the patient gave an indication of an endocranial complication; but no fistula could be found until the second day when a drop of pus was seen trickling forth through the very small opening in roof of the antrum.

There may be some doubt as to how the epidural abscess originated. The most natural explanation is that the primary suppuration was in the antrum and from there extended through the fistula to the dura. That the membrana tympani was intact is not opposed to this supposition. The possibility of the abscess having arisen from an acute inflammation of the mucous membrane in the cavum tympani cannot be excluded. In that case the antrum, the walls of which were firm, with mucosa but little swollen, acted only as a reservoir from which the pus emptied itself into the auditory passage through the *locus electus*, namely, the most upper and posterior part of the auditory passage just external to the membrana tympani, where the blood vessels lie.

The epidural abscess did not make itself known by brain symptoms, as crossed paralysis, disturbances of speech, or slow pulse, which symptoms are seldom present in adults, but occur in children. Only the drowsiness of the patient bespoke an increased pressure on the brain. The pulse was at first 80, regular and vigorous; later it varied between 68 and 72. Even after the evacuation of the

abscess which diminished the pressure on the brain, it remained unchanged.

Later it was found that the pachymeningitis had extended very considerably backward and upward. This necessitated the denudation of a large area of dura. The dura was spongy, covered with granulations, swollen and in one place necrotic. It was left entirely undisturbed, as experience has shown that adhesions form quickly between dura and arachnoidea. Consequently, too radical procedure with sharp curette, scissors and forceps may break down this natural barrier and easily cause the added risk of an infection of the suberachnoid space.

The wound was kept open throughout and dressed with moist gauze compresses. When pus was seen trickling forth between the granulations in the anterior part of the wound, exploration located a cerebral abscess as large as a pigeon's egg in the frontal lobe. This abscess had been lying in the depths probably, and gradually worked its way to the surface of the cerebrum. There it had perforated the adherent membranes and escaped epidurally.

The frontal abscess was not opened until eleven months after the beginning of the illness. When it started, it is impossible to tell; but it must have been late for the patient felt very well after the evacuation of the temporal abscess. He was even discharged from the hospital, and during the six weeks that passed before his readmission he was able to partially perform his work as a shoemaker. The hammering on the shoe, as it was held firmly over his knee at times caused him violent pains, "as if his head were to burst." The abscess was located in the third frontal gyrus, but, for all that, there was no sign of motor aphasia. The eye grounds were normal in spite of the cerebral abscess and extensive pachymeningitis. For anaesthesia only ether was used. The patient showed no signs of respiratory disturbance at any of the operations.

A CASE OF LARYNGEAL TUBERCULOSIS WITH EXHIBITION OF SPECIMEN.*

BY OTTO J. STEIN, M.D., CHICAGO, ILL.

During January, 1901, H. G., a Jew, fifty years of age, the father of a family of three healthy adult children, was suddenly troubled with acute pain in the right abdomen; which continued intermittently until February, when he was operated upon, and a portion of the omentum on the right side was found diseased, and removed. It was the opinion of the surgeon that the omentum removed was tubercular, although a malignancy was strongly suspected by others interested in the case.

Shortly following the removal of the diseased omentum, Mr. G. noticed a hoarseness, which remained permanent, and shortly following this, pain about the throat began. He was a man of rugged appearance, always enjoying good health up to the onset of the abdominal trouble. His habits, at this time, were moderate, although he indulged considerably in the drinking of spirits and the smoking of tobacco. He placed himself under the care of a most competent specialist, who treated his throat for four months, at which time the patient presented himself to me for further treatment.

My examination of the patient at that time revealed the following condition: A man fifty years of age, small of stature, weighing 131 pounds, with an emaciated face, but complaining of no physical weakness or any disturbance of health, excepting a cough which, although of mild severity, was not distressing or painful. The cough was associated with an expectoration that was free and easy; white and frothy; containing very little pus, no blood; and free from tubercle bacilli, but full of streptococci. Pulse and temperature both normal. Some enlarged deep-seated glands on the left side of the neck. Physical examination of the chest failed to reveal any lung involvement. The voice was almost aphonic but no dyspnoea was present. No history of a luetic nature could be obtained. His occupation, that of a clothing merchant, and his habit of excessive smoking, in my opinion, contributed much to the irritation of his throat. The larynx upon examination, presented an active ulceration of both vocal cords. The posterior half of the right one was destroyed, and the posterior third of the left cord was similarly ulcerated. The right ventricular band was markedly infiltrated, and

* Read before the Chicago Laryngological and Otological Society, October 3, 1905.

a very small granuloma occupied the interarytenoid position. The remaining mucous membrane of the larynx was pale in color.

With the impression that we had here a case of mixed infection, mercury and iodine were given, and the ulcerations were curetted, after which lactic acid, alternating with thuga, was applied. The scrapings from the ulcerated areas, as well as the sputum, were examined at various times, but never was there any giant cells or tubercle bacilli found.

Mr. G. continued steadily to improve during the following two months, so that he complained neither of cough or pain of any kind, and he had gained eight pounds in weight. The ulcerated areas in the larynx to all appearances were in a cicatrized condition.

Two months later he complained of a general ill feeling. His cough was insignificant, and he had no throat pain, but he was resting poorly at night, and had lost two pounds of the eight he had just gained. Temperature always normal. He declared that the site of the abdominal operation hurt him at times, which I ventured to say was the result of adhesion.

Two weeks later he caught a severe cold from an exposure to wet weather, and immediately his throat symptoms became worse; but he promptly rallied from this relapse and during the following eight months had no complaint excepting the hoarseness, but the arytenoid region of the larynx began to show considerable infiltration, although no new areas of ulceration could be seen.

During the following year the patient presented himself with regularity for treatment, but no further retrogressive changes manifested themselves. All of a sudden the old symptoms of severe cough and pain about the throat, especially now on swallowing, reappeared with considerable severity. He also complained of abdominal pain, especially located about the region previously operated upon. Occasional examinations of the chest had been made; but, up to this time, there had been no evidence whatsoever of pulmonary involvement. It was about January, 1905, four years after his trouble first began, that physical signs of lung changes were to be made out. His family physician, Dr. Lackner, and myself discovered them about the same time. His weight at this time was 121 pounds, compared with 139 pounds three years before. The dysphagia and odynphagia were now very severe, and the inroads of the disease within the larynx could readily be traced by the enormous infiltration of the arytenoid region, so that the arytenoids overlapped and almost entirely shut off the introitus of the larynx, and as a consequence dyspnoea became an additional symp-

tom. The epiglottis soon participated in the infiltrative and ulcerative process, so that the pain, as in all these cases, was intense. Sharp, lancinating pains were experienced in both ears, and Wolfenden's method of feeding had to be resorted to in order to admit of any nourishment being taken. In May, 1905, the patient died.

The local treatment of this case consisted in the use of lactic acid, preceded by the curette; thuga, formalin, silver nitrate, guaiacol-vasogen, cinnamic acid, the intratracheal injections of a solution of menthol and iodoform, and during the painful period, anesthesin and orthoform. The formalin in 5 to 10 per cent solutions, proved particularly to be of benefit.

Permission for an autopsy having been given and requested by the patient before his death, the same was proceeded with shortly after death by Dr. Sheppard of Michael Reese Hospital, in the presence of Dr. Lackner and myself. The site of the abdominal operation showed a nicely healed omentum, with no recurrence here; but extensive, but loose, adhesions between it and the belly and pelvic walls were found. The appendix was normal. The first two or three feet of the small intestine showed several areas of tubercular deposits about the size of a silver dollar, but there was no breaking down of the tissues. The remaining small and all of the large bowel seemed normal. Stomach, bladder, liver and spleen, as well as the heart, showed no changes. Both lungs were peppered throughout with miliary deposits. No abscess cavities or cicatrices were found, and only a few calcareous spots. The larynx, as will be seen from the specimen herewith presented, shows the great area of involvement. Almost every part of the larynx has participated in the tubercular process. The destruction of the cords is readily seen, as well as an extensive subglottic ulceration extending to the trachea. This latter ulceration was never seen during life, owing to the overhanging infiltrated arytenoids. The turbin-like enlarged epiglottis, with its ulcerated sides, is seen as the final result of this insidious disease.

Looking retrospectively at a case like this, covering a period of several years, tracing its favorable and then its unfavorable manifestations year after year, and finally studying the results of the morbid process at the autopsy table, offers us an opportunity to discuss several important points, which for brevity sake I will summarize as follows:

First. At the very beginning of the laryngeal trouble the question of diagnosis was of the utmost consideration. To start with, we had the history of an abdominal operation for some acute symptoms, which resulted in the resection of a portion of the omentum, and

which was declared by a competent and conservative surgeon to be tubercular. On the other hand, other competent men from observation of the course of the symptoms and the age of the patient were inclined to a diagnosis of a malignant condition. All other organs, excepting the larynx, appeared to be healthy and functionating normally, and if we had a cancer to deal with it was of vital importance to operate at once. But the appearance of the larynx presented nothing sarcomatous or epitheliomatous. The ulcerated cords, as far as their appearance went, might have been the result of lues, tuberculosis or perhaps a streptococcus infection, but that one could have such destruction of the cords from a streptococcus infection without any toxic symptoms seemed unreasonable to believe. The great degree of destruction without any disturbing symptoms or other organic involvement, or any depressing physical manifestations, such as temperature, muscular weakness, loss of weight, sweating, etc., argued more for the luetic diagnosis. The presence of a tiny granuloma between the arytenoids did not prove it to be tubercular, and the absence of tubercle bacilli both from sputum and scrapings detracted somewhat from such a diagnosis.

Second. Having decided on a diagnosis of tuberculosis, it was of the greatest importance to determine whether it was confined to the larynx, or if it was associated with other organic involvement.

Third. The solution of the former question has a great bearing upon the next one, and that is, the advisibility of early radical operative interference. It is my opinion, as already expressed upon previous occasions, that where we have a circumscribed and limited tubercular involvement of the larynx, without evidence of active pulmonary or other organic involvement, and with the patient in a generally fair condition of health, it is consistent with good advice and practice to remove the involved parts by some radical procedure.

This case therefore, when I first saw it, was not favorable for such a procedure, because the trouble was not unilateral, but involved both cords and the interarytenoid space. The omentum appears to have been the original center of infection, after which the larynx participated as a secondary center of involvement, due in all probability to a chronic catarrhal inflammation of this organ, the result of excessive smoking and occupation. Finally, the lungs and the bowel became involved in the process as a result of dissemination of the infection from the larynx. Where such an involvement is circumscribed and where it is seen early enough, and is at the same time favorably located for complete extirpation, it is always good surgery to remove it.

100 State Street.

CYST OF THE THYRO-GLOSSUS DUCT. REPORT OF A CASE.*

BY DR. JOHN J. KYLE, INDIANAPOLIS, INDIANA.

Persistence of the thyro-glossus duct is a subject of interest because of its comparative rarity, varied pathological changes developing from it, and the age at which a cyst of the duct may become manifest.

In the early embryonal life, the thyroid gland consists of three parts. The two lateral halves are derived from the endodermic lining of the fourth visceral furrow. The central portion of the gland is an outgrowth from the ventral wall of the pharynx in front of the second visceral arch, at the juncture of the basal portion of the tongue, and the anterior portion of the tongue developing from the tuberculum impar. The foramen coecum represents the median thyroid diverticulum, which elongates and as it bifurcates, occupies a position in front of the trachea, forming the isthmus of the thyroid bodies. The diverticulum which extends thus from the foramen coecum to the isthmus of the thyroid bodies, is called the thyro-glossus duct, or canal of His. About the eighth month of foetal life, this connecting band should be obliterated.

The location of a cyst of the thyro-glossus duct may be anteriorly, that is, near the isthmus of the thyroid gland, or posteriorly, or near the median line and at the base of the tongue.

In the greater number of cases reported, cysts of the thyro-glossus duct were situated anteriorly. The etiology of the condition is faulty embryological and foetal development, probably supplemented by traumatism.

The pathology is somewhat interesting, and according to Haeckel, "The contents of a cyst of the thyro-glossus duct is usually a yellow, mucoid substance. The cyst wall is frequently very thin and lined with ciliated epithelium and may contain definite thyroid substance." The tumor is usually movable and of slow growth. Following infection, rupture may take place with the formation of a permanent pustule, situated either anteriorly or posteriorly.

The symptoms vary greatly, according to the location of the cyst. If located anteriorly, there is a circumscribed swelling, varying in size from a small bean to a walnut, in the median line, beneath the deep fascia of the neck, and between the hyoid bone and the

* Read at the Tenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, at Buffalo, N. Y., September 15, 1905.

center of the thyroid cartilage. The tension of the tumor varies as it grows and developes, being at first hard, and finally soft and fluctuating. There is little or no pain complained of when the cyst is located anteriorly, other than irritation produced by friction from collar or neck band.

A cyst may make its appearance at any age. Dowd (1) observed the condition in a child two years of age; Johnston (2) a case in a girl five years old; Armstrong (3) a case in a boy six years of age; Bazin (4) a case of eleven years; Barrett (5) one case at seventeen years; Payne, in a small child; Riesman (6) in a man of fifty-six years, in which a cyst had continued since the patient was eighteen years of age and resulted from traumatism; Senn (7) two cases varying from sixteen to twenty-five years; Robinson (8) in a patient fifty-five years of age, in which the cyst had persisted as long as the patient could remember.

In my own case, the patient, a woman forty-two years of age, first noticed swelling and pain four years before consulting me. At times the site of the cyst would become swollen and tender, with a sensation of wanting to swallow as if something had lodged at the base of the tongue, also at times, an expectoration of frothy sputa. The cyst would remain in this position varying from one to two weeks, after which it would apparently disappear, to return again at almost regular periods of a month. At times the menses were somewhat irregular. These attacks continued and grew worse, swallowing becoming more difficult and also smothering sensations at night from the swelling. From the above, it is reasonable to presume that the cyst though located anteriorly, emptied posteriorly. From the inflammation surrounding the duct, it was temporarily closed, and in consequence, the direction of least resistance was externally.

The cyst was opened by a physician about three years after its first manifestation, by a simple incision, after which it would refill and rupture spontaneously at irregular periods, varying from a few weeks to two or three months.

The symptoms of a cyst of the duct situated posteriorly, are somewhat more distinct than those situated anteriorly, and, as in the case of Johnston, may become so large as to press upon the epiglottis, producing dyspnoea grave enough to necessitate intubation. When located posteriorly, the cyst may be situated to the right or left of the median line, yet springing from a median structure. There will be circumscribed swelling, fluctuation, absence of temperature and difficult swallowing.

With the foregoing enumeration of symptoms, the diagnosis of an anterior or posterior cyst of the thyro-glossus duct is comparatively easy. It will be unfortunate if the histo-pathology of the disease is overlooked and simple draining only, is recommended. The condition has no tendency to spontaneous recovery and may from our knowledge of the etiology of a malignant tumor, predispose to some form of that disease. The contents of a cyst may be discovered by puncture. If a fistula exists externally, it is sometimes possible to force fluids which the patient can detect by the taste, through the duct and into the mouth. In the case of the author, the lysol solution when forcibly injected into the fistulous opening could now and then be tasted at the back of the tongue. In the absence of this test, the location of the cyst or fistula will suggest its character.

The treatment of cyst of the thyro-glossus duct is essentially surgical and consists in the complete excision of the cyst and its limiting membrane and healing by a slow process of granulation. In external cyst or fistula, the tissue should be dissected from the upper portion of the hyoid bone to the thyroid isthmus. The two extremities of the wound may be brought together by suture and the wound packed with strips of iodoform gauze. The packing should be changed daily until recovery is complete.

Cysts located internally are, from the location, difficult to treat. The treatment must consist in curettement and the application of escharotics.

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EXPERIMENTS ON ANIMALS WITH ETHYL CHLORIDE.*

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In presenting the results of our experiments on animals, we wish to say that the subject has not been thoroughly worked up as we had hoped it might be at this time, so we are obliged to present a very incomplete preliminary report. The material from which our conclusions are drawn, consists of the observations obtained, from a series of experiments on eighteen dogs. The research was undertaken with the object of determining the effect of Ethyl Chloride upon respiration, heart and blood pressure, and also the causes of death. We also sought to determine the practicability for prolonged anaesthesia.

The method of administration was in the form of the gas which the animal was allowed to inhale from a metal mask, which was placed over the nose and mouth or attached to the tracheal cannula, and to which the Ethyl Chloride container was connected by means of a rubber tube. The mask was provided with a valve which allowed the expired air to escape readily and also a certain amount of air to be mixed with the gas at each inhalation. The amount of air in the mixture was varied with different animals and also in the same animal.

There was no means of estimating the amount of air in the mixture therefore we are unable to draw conclusions as to its practicability for prolonged anaesthesia. We have however a method in mind by which we hope to determine this question at a later date.

TIME REQUIRED TO ANAESTHETIZE.

Of the eighteen dogs, one (dog 3) we were unable to anaesthetize with ethyl chloride but this same animal took two ounces of ether later and was not fully under. The anesthetic was changed to A. C. E. mixture and he was fully anaesthetized three minutes later. In one animal the time was not noted. Of the sixteen remaining dogs the minimum time for anesthesia was 45 seconds the maximum time 4 minutes. The average time 110 seconds.

* From the Pharmacological Laboratory of Western Reserve University, Cleveland, Ohio.

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DEGREE OF ANAESTHESIA.

In our earlier experiments, we aimed at the degree of anaesthesia which we were accustomed to observe with ether and chloroform, i. e. the abolition of all reflexes. We found later that this was not necessary, and in fact, not advisable; for when this degree of anaesthesia was reached we bordered on the danger period. Of the eighteen dogs, 5 had all reflexes abolished while the remaining 13 had conjunctival reflexes present, or even incomplete muscular relaxation.

It was found that operation could be performed on these unrelaxed animals without their showing any evidence of pain. The operation consisted in placing a cannula in the trachea, (through which the anaesthetic was afterward administered), and a cannula in the carotid for blood pressure tracings; the time occupied in this operation was from two to four minutes. The anaesthetic was usually stopped entirely during this time.

AS A PRELIMINARY TO ETHER AND CHLOROFORM.

In twelve of the dogs, the anaesthetic was changed to ether after the tracheal cannula was inserted. In all cases (except Dog 3 already mentioned), they took the ether without any struggling or evidence of laryngeal irritation. In one dog the anaesthetic was changed to chloroform in which case the animal stopped breathing.

EFFECT ON BLOOD PRESSURE.

Wood and Cerna,[1] who experimented upon rabbits, observed an increase in respiratory movements and a decrease in arterial pressure during narcosis, with an immediate return to normal as soon as the anaesthetic was stopped.

The heart rate is first diminished in frequency and then increases later in the experiment.

Ruegg,[2] of Basle later took up the investigation, and admits there is primarily a slight fall of blood pressure, which he attributes to the administration of a dilute vapor, where a vaso dilatation occurs, but increase of vapor strength immediately counteracts this effect by increase of the heart's action, any further fall of blood pressure he attributes to toxic doses.

In twenty-two cases of our series where the effect on blood pressure was recorded, seventeen cases gave a primary fall, varying from 13 mm. to 100 mm. of mercury. Average fall 50 mm. Two cases

1 Taken from article by Charles Greene Cumston in *Boston Med. and Surg. Journ.*
2 Taken from article by Thos. D. Luke in *Edinburgh Med. Journ.*

gave a slight gradual rise. Three cases gave a rise followed by a fall.

By consulting Table No. 1 it will be seen that in nearly all cases, there is a more or less marked fall which we can say positively is not due to the vapor being too dilute, for in some of these cases an increase in the anesthetic causes a further fall. (Fig. 1.)

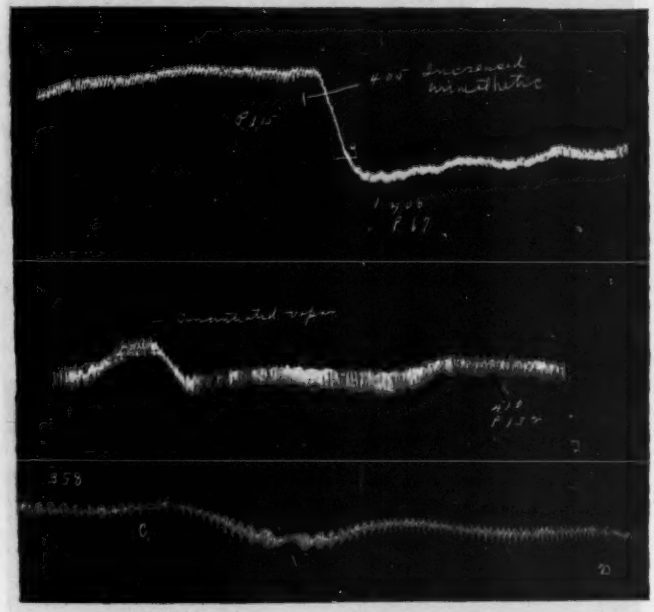

Fig. 1. Increase of Ethyl Chloride causing further fall of blood pressure.

It will also be noticed that in a number of the cases where the pressure recovers towards normal, (or where there is a secondary rise), there is a tendency to asphyxia or increased respiration and even convulsive movements. (Fig. 2.) This may in part explain the cause of the rise.

Our experiments would therefore tend to agree with those of Wood and Cerna; but as previously mentioned, we are not justified in drawing any definite conclusions, until a means has been devised, whereby the amount of air given with the anaesthetic can be estimated.

EFFECT ON RESPIRATION.

The repiration was observed upon eight dogs. Four of these showed a marked increase while in three it was slowed. In one

Fig. 2. Asphyxia accompanying rise of blood pressure. Lower tracing respiratory.

case the heart and respiration ceased suddenly without any warning. This observation was repeated four times upon the same animal. The cessation of the heart in each case was due to vagus stimulation

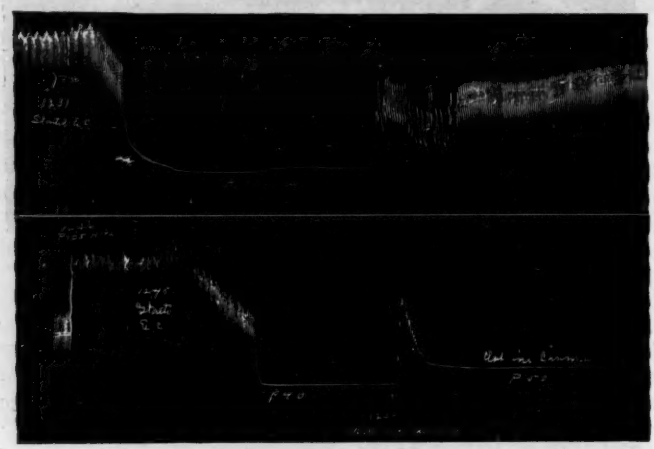

Fig. 3. Stoppage of heart due to vagus stimulation. Upper tracing heart starts spontaneously. Lower tracing vagi are cut and heart starts immediately. Clot in cannula prevents tracing.

and there was probably a paralysis of the respiratory center occurring at about the same time. (Fig. 3.)

Recovery took place spontaneously in each instance, except one where artificial respiration was employed; and the last, when the heart started immediately after section of the vagi but the respiration did not recover. The vagus stimulation therefore involves the center, and is probably reflex, and similar to the primary vagus stimulation by choloform.

EFFECT ON THE HEART.

In twenty-two cases where the effect of administration was observed upon the heart, there was an increased heart rate in eight cases. In one of these eight cases there was slowing which came on later due to vagus stimulation. (Fig. 4.) In thirteen cases there was slowing, five of these were plainly due to vagus stimula-

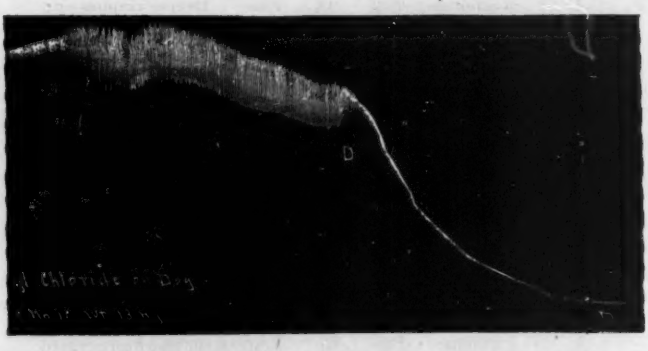

Fig. 4. Prolonged administration. Heart stimulated (reflex vagus stimulation) to increased excursion with a sudden weakening and fall of blood pressure.

tion. In one case there was no change in rate throughout the time which the anaesthetic was given. From the five experiments done it is quite evident that Ethyl Chloride has an effect upon the heart through the vagus center, and probably a depressant action on cardiac muscle similar to that of chloroform.

EFFECT ON THE EXCISED HEART.

One experiment was made on the excised dog's heart by Langendorff's method. The heart was perfused with Locke's fluid when the organ began to beat at the rate of 142 per minute. The perfusing fluid was then changed to Locke's fluid containing less than 1% ethyl chloride. The heart became slower and weaker at once.

It is revived again by pure Locke's fluid but does not return to the original rate and strength. This was repeated the second and third time. Each time the heart became weaker and finally stopped. On examination the cardiac muscle was found to be in rigor.

TABLE No. 1.

Dog	Observation	Time after anæsthetic started	Primary effect	MM of Hg	Secondary effect	Accompanying Rise
1	1	1 minute	Fall	24	Rise	Convulsive movements.
	2	1½ minutes	Fall	13	Rise	Convulsive movements.
	3	½ minute	Fall	20	Rise	
	Increased anæsthetic	½ minute	Fall	48	Sl. rise	
2	1	6 minutes	Fall	43	Rise	Deeper respiration.
	2	4 minutes	Fall	47	Rise	
	3	1 minute	Fall	94	Sl. rise	Respiration shallow.
	4	8 minutes	Fall	100	Toxic Dose.	
3	1	2 minutes	Fall	32	Rise.	
	2	1 minute	Sl. rise			
	3	½ minute	Rise	30	Fall	
4	1	5 minutes	Rise		Rise	Asphyxia.
	2	3 minutes	Fall	50	Rise	Asphyxia.
	3	2 minutes	Fall	20	Rise	Asphyxia.
	4	1½ minutes	Fall	50	Rise	Asphyxia.
	5	2 minutes	Fall	30		Asphyxia.
10	1	1½ minutes	Fall	100	Respiration and heart ceased.	
	2	2 minutes	Fall	80	Respiration and heart ceased.	
	3	1 minute	Fall	66	Respiration and heart ceased.	
	4	1 minute	Fall	65	Respiration and heart ceased.	
11	1	10 minutes	Rise	slight	Fall	Toxic.
12	1	6 minutes	Rise	16	Fall	Toxic.
14	1	3 minutes	Fall	70	Toxic	Cord and vagi divided.

CENTRAL VAGUS STIMULATION.

This effect was observed on three dogs of the series. In each case the heart stopped completely, in two it started immediately after section of the nerve while in the third it failed.

CESSATION OF HEART AND RESPIRATION.

Observations were made upon eleven dogs, and during the observations respiration ceased sixteen times. The respiration ceased five times when the heart did not stop. In each instance, it

was revived by artificial respiration. In the remaining eleven cases, the heart also stopped. In six of these cases the respiration ceased before the heart. In one case respiration ceased after the heart. In two cases it ceased with the heart. In two cases the time was not noted.

The results are given more in detail in Table No. 2.

TABLE No. 2.

CESSATION OF HEART AND RESPIRATION.

Dog.	Heart.	Respiration.
1	Stopped. Revived after 10 minutes with adrenalin.	Ceased. Time not noted.
2	Stopped.	Ceased. Revived by artificial respiration. Ceased 1½ minutes before heart.
3	Stopped.	Ceased. Time not noted.
4	Stopped.	Ceased. Revived by artificial respiration. Ceased ½ minute after heart.
6	Stopped.	Ceased. Revived by artificial respiration. Ceased 5 minutes before heart.
8		Ceased. Revived by artificial respiration.
10*	Stopped. Starts spontaneously after 5 minutes.	Ceased with heart; starts spontaneously a few seconds after heart.
	Stopped.	Ceased 1½ minutes before heart. Artificial respiration.
	Stopped. Starts spontan.	Ceased 2 or 3 seconds before heart; starts spontaneously ½ minute after heart.
	Stopped. Vagi divided; starts immediately.	Ceased with heart; does not start.
11	Stopped.	Ceased 2 minutes before heart.
12	Stopped.	Ceased ½ minute before heart.
14	Stopped.	Cord snd vagi are divided. Artificial respiration throughout exp.
15		Ceased. Revived by artificial respiration.

* Note. The cessation of the heart in this animal was plainly due to vagus stimulation.

PROLONGED ADMINISTRATION.

Prolonged administration was tried on nine of our animals. In all cases there was either asphyxial convulsions, cessation of respiration or stoppage of the heart. The minimum time was 1½ minutes, in which case the heart stopped. The maximum time was 27 minutes in which case the anaesthetic was stopped owing to asphyxial convulsions. For length of time given in each case see Table 3.

CAUSES OF DEATH.

In eight of our animals where death was due to ethyl chloride, which includes those on which we sought a fatal termination in order to determine the cause of death, we found: In two cases death was due to asphyxia. In three cases death was due to cessation of the heart. In three cases death was due to paralysis of respiration.

TABLE No. 3.

EFFECT OF PROLONGED ADMINISTRATION.

Dog	Length of time given	Effect
1	27 minutes	Asphyxial convulsions.
2	25 minutes	Asphyxial convulsions.
3	18 minutes	Asphyxial convulsions.
4	21½ minutes	Asphyxial convulsions.
6	5 minutes	Died.
10	1½ minutes	Heart stopped.
11	14 minutes	Respiration ceased.
12	26½ minutes	Respiration ceased.
14	8 minutes	Respiration ceased.

CONCLUSIONS.

From our limited numbers of experiments and the method of administration we may draw the following conclusions:

1. It is rapid in action and causes little struggling in comparison with ether.
2. It is practicable as a general anesthetic for short operations.
3. It is not necessary that reflexes are abolished before sensibility to pain is lost.
4. It is practicable as a preliminary to ether and chloroform.
5. It causes a lowering of blood pressure comparable to that of chloroform.
6. It seems to first stimulate and later paralyses the respiratory center.
7. It has an effect upon the heart through the vagus center, tending to cause stoppage of the heart, in the same manner as is seen in the early period of chloroform administration.
8. The experiment with the excised heart indicates that ethyl chloride has a direct depressant effect on the cardiac muscle, similar to chloroform.
9. It is not without danger when the administration is prolonged, and is not practicable for prolonged anesthesia, at least by the present method of administration.

CLINICAL REPORT.

Up to the present time, we have used ethyl chloride as a general anaesthetic in 200 cases, the youngest of which was 10 months, the oldest 68 years.

In only two cases were we unable to anaesthetize the patient, using the old form of mask where the ethyl chloride was sprayed into the top.

There was nausea and vomiting in but two cases of the series and this may have been due to swallowed blood, following tonsillotomy and adenectomy.

The time required for anaesthesia was from one-half to three and one-half minutes. This agrees very closely with the time required in our animal experiments.

The duration of anaesthesia was from one to four minutes. The operations consisted in the removal of tonsils and adenoids, paracentesis, opening of abscesses, etc.

Since using the improved form of mask where the vapor only enters the mask, there has not been any cases in which we failed to anaesthetize. It has also been used successfully as a preliminary to ether and chloroform in twenty-six cases.

536 Rose Bldg.

Some Ophthalmological Phases of Diseases of the Accessory Sinuses of the Nose.—Wm. Campbell Posey (Philadelphia) —*Journ. Eye, Ear and Throat Dis.*, March-April, 1905.

Posy states that the more striking and advanced ocular symptoms of diseases of the sinuses are now generally recognized, but he presents a series of cases which show early and but slightly marked symptoms of sinus disease, and in which the ocular manifestations often precede all others; such cases he finds by no means infrequent. It is to be feared, he believes that unless the symptoms occasioned by a sinusitis are so patent that they cannot be overlooked, the connection between ocular and sinus disease is dismissed. Ophthalmologists forget, or are unaware, that very active sinusitis may exist without nasal discharge. Posey gives six groups of cases, based upon the ocular conditions which are present in the optic nerve, fifth nerve, eye-lids, ocular muscles, and lachrymal sac.

HOW MUCH ATTENTION SHOULD WE GIVE THE MIDDLE TURBINATE BODY IN DISEASES OF THE ACCESSORY SINUSES?*

BY CHARLES M. ROBERTSON, M.D., CHICAGO, ILL.

In describing the anatomy of the nose mention is made of the scroll shape of the inferior turbinate body. It hangs well in from the external wall of the nasal cavity. This is not so of the middle turbinate. Its surface is markedly less scroll-shaped and the distance from its external surface and the outer nasal wall is very limited, being seldom more than four m. m. and often not over one or two m. m. Should there be a deviation of the septum with a hypertrophy of the turbinate or of the septum, it is wedged into the space so as to make it impossible to pass a pledget of cotton on either side of it.

The different types of middle turbinates are so varied that it is impractical to formulate much of a table of sizes and shapes. The extension of ethmoidal cells into this body makes its appearance varied and in most instances the two middle turbinates are asymmetric. We often find a long flat bone on the one side, while on the other we have a large mass composed of one or more ethmoidal cells. These cells may communicate with the cells above or may be distinct from them. We often find this body containing cysts which probably were or are cases of empyema of long standing in the body itself.

In cases where we have to deal with hypertrophic rhinitis we are impressed by the constant rule which hypertrophy follows.

We notice the first place to hypertrophy is the posterior end of the inferior turbinate body. Then the lower edge of the same body, after which comes the anterior end of the middle turbinate. This rule is almost constant.

In hypertrophy of the inferior turbinate, we have no serious conditions arising save the damming back of tears by the pressure on the lachrymal canal where it empties into the nostril and the occlusion of the nostril due to an overgrowth existing in the inferior meatus.

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* Read before the Tenth Annual Meeting of the American Academy of Ophthalmology and Oto-Laryngology, held at Buffalo, September 14, 15 and 16, 1905.

This is not so with hypertrophy of the middle turbinate and especially where the anterior end is mostly involved. The openings of the anterior group of sinuses are thus pressed upon by the enlarged turbinate and as a consequence there is a closing of these cells from the air in the nose. I have studied this condition for some years past and become more and more impressed with the idea that pressure has to a very large degree to do with prolonging if not producing sinusitis.

In an article published a year or two since which appeared in the Journal of the American Medical Association, I called attention to a few cases of non-suppurative inflammation of these air cells caused by an enlarged anterior end of the middle turbinated body. These cases gave all the subjective symptoms of sinus disease but none of the objective ones. In all the cases, the middle turbinate was directly responsible for the symptoms present by occluding the orifice of the sinus by a swollen or hypertrophied condition. The truth of this statement was proven by reducing the size of the turbinate at which time the symptoms promptly disappeared.

We know in nearly all cases where an empyema of the antrum exists we have exuberant granulations about the orifice of the cavity and often associated with myxomatous degeneration of the anterior end of the middle turbinated body. This most books mention as a cause of empyema, but it is fully understood to be a sequence of sinus disease. I cannot recall many cases where I have had to deal with empyema of these cavities where the middle turbinate has been normal. Very little stress is paid these cases as far as the pressure closing is concerned, and I have repeatedly observed cases where an external or radical operation had been performed without first trying to establish communication through the natural orifice by amputating the parts encroaching upon the patency of the cavity involved.

This is the excuse I have for bringing this subject to your notice. I have gone so far as to tell students to expect sinus disease when polypi are found in this region and I now think it may be said the same holds true where the middle turbinate is hypertrophied so as to make the openings liable to pressure closure.

If when we examine a nostril we find a middle turbinate wedged in between the septum and the hiatus semi-lunaris we should see that it is removed. If we find the tissue of the anterior end of the middle turbinate myxomatous we should make an exploratory puncture of the antrum to see if there is not pus present. It will be

surprising to find the large number of cases where the exploratory findings will justify our trial.

I should be pleased to have the expression of this body as to whether they think a sinusitis exists without hypertrophy of the middle turbinated body? I have seen some cases of long standing where there was room enough under the turbinate for drainage; but these cases were with a probable tubercular finding.

There are hypertrophies which may be very small and yet produce marked interference with ventilation and drainage of the sinus emptying into the hiatus semi-lunaris; whereas on the other hand a very large hypertrophy may leave sufficient room under it for both ventilation and drainage. The rule adopted by the author is to be guided by the space under the body rather than by the size of the body. If the turbinate is found to be encroaching on the side wall of the nose I invariably cut away the anterior end.

I am not advocating indiscriminate cutting of turbinates; for this is certainly a bad practice, as we know the chief function of the nose is destroyed by cutting away too much of the corpora cavernosa, and as a result atrophic changes occur in the nose and pharynx. We should aim to remove enough tissue to produce space sufficient for the escape of all secretions and give a chance for drainage. Any more than this is to be decried. Many specialists are prone to be too free in the use of the knife and thereby sacrifice more tissue than is necessary. A turbinate which is hypertrophied cannot perform its normal function, as we all recognize; yet it is a vicious habit to destroy any more tissue than is absolutely necessary.

100 State Street, Chicago.

SOCIETY PROCEEDINGS.

CHICAGO LARYNGOLOGICAL AND OTOLOGICAL SOCIETY.

Regular Meeting, October 3, 1905.

WM. L. BALLENGER, M.D., *President.*

Fibro-Lipoma of the Throat.

DR. E. FLETCHER INGALS exhibited a patient, and said: You will recall my presenting the history of a case some time last winter, in which a man had a large fibrolipomatous tumor in the throat. I removed a piece of it and the remainder fell through a hole in the mucous membrane of the larynx and choked him, so that I had to do an instant tracheotomy; and after perhaps ten or twelve days, another piece was removed, so that the tumor was pretty nearly all taken away. Before he left the city I injected the remainder of the growth with lactic acid, using two per cent carbolic acid, with a view to preventing after-pain from the injection of the twenty per cent lactic acid. I had not seen him again until yesterday, when he came to the office, and I found that the appearance of the growth had changed considerably. It seems to me it is considerably smaller than it was when he went home, although I must confess I cannot tell exactly what the size of it was at that time. It appears to be located differently. The record shows a tumor on the upper surface of the right side of the epiglottis, but not attached to the pharyngeal wall, as I had supposed it was when I first saw him. Looking back a few pages in the case record, we find the tumor as I saw it last winter, when I caught it with snare and had the critical time with him.

I asked the patient to come here to-night because I wanted the members to look at him and suggest what is best to do for him. He cannot stay in the city long. I used two per cent carbolic acid and twenty per cent lactic acid, injecting twenty minims. He bathed the throat during the night with ice water, for the purpose of keeping down the inflammation. He used cold water during the night, and when I saw him to-day the mass was much larger than when I saw him yesterday, not twice as large, of course, and the growth was not enough to be in any way distressing, or the cause of danger.

After the trial last winter, the only thing that seemed to offer a good outlook was to make an external incision and remove the

growth in that way. This was recommended, but he objected to it, and when he looked much better yesterday, I thought it would be well to follow out the plan we started.

DISCUSSION.

DR. PIERCE: The mirror picture is very much like that of a branchial cyst. It seems to invade different tissues; apparently being embedded in the side of the epiglottis and the base of the tongue and pharyngo-epiglottic fold. I believe that a permanent and thorough result can hardly be obtained by local treatment; if it were my case, I would advise removal by external operation, namely, Langenbeck's lateral pharyngotomy.

DR. INGALS, in closing the discussion, said: It seems to me the suggestion of Dr. Pierce as to the treatment is radical. The patient will not consent to an external operation on account of the impairment.

As to its being a branchial cyst, I suspected it when he came back last fall. I first removed the growth some five years ago, and when he came back last fall the appearance of it led me to believe that I had made a mistake. I thought we had to deal with a branchial cyst, but the result of the operation disclosed that it was not.

Presentation of Cases Operated on by the Killian Method for the Cure of Suppurative Frontal Sinus Disease.

DR. NORVAL H. PIERCE: I have two cases of frontal sinus abscess that were operated on by the Killian method, one of which was operated by me and another one by Professor Killian himself, and these two patients have been kind enough to come here to let you see the result of the operation by the originator of the method.

Mr. K., was a patient of mine before he went to Europe, and a diagnosis of empyema of the frontal and anterior ethmoidal cells and antrum was quite easy. I treated him by local methods, for a long time. Both he and myself became discouraged and I advised radical operation. He chose to go to the fountain-head, to Killian himself, and comes back more than satisfied. I saw Mr. K. some time after the operation, which was done in July. At that time there was nothing to be particularly proud of, as the antrum was full of cheesy matter; there was osteomyelitis of the anterior portion of the upper jaw bone. Mr. K. again went to Europe, and the operation on the antrum was completed. The surgical treatment has been successful. Mr. K. is now entirely well.

The other case I operated on three weeks ago to-day. It has several points of interest: (1) Marked deviation of the septum to the left; (2) destruction of the bony septum between the two sinuses and (3) the peculiarity of the history.

The young man says that almost as long as he can remember he has had attacks of swelling of the left eye and exophthalmos four or five times a year. The eye would return to normal. The attacks were accompanied by great headache, but there was no history of nasal discharge until lately. For some time past, he says that he has become mentally obtuse. He is a newspaper man, and he thinks that his memory has been failing him, and on account of some pain over the eye and a discharge from the nose, together with this mental hebetude, he applied to me for relief. The diagnosis was made, not by intranasal examination, because it was exceedingly difficult to get a view of the region about the anterior head of the middle turbinated body, but on account of the history of swelling, exophthalmos, and because there was a discharge of pus from that side of the nose. The usual incision was made, and the moment the mucous membrane was punctured, the pus pulsated out of the wound. This made me suspect a perforation of the inner tablet of the skull but I found none. The partition between the two frontal sinuses had entirely disappeared, and the other frontal sinus was full of granulation tissue and pus, so that a probe inserted at this point could be very easily run in as far as this. The floor of the sinus was removed, also the frontal process of the superior maxilla and the anterior cells of the ethmoid, and the perforation was closed. Healing occurred by first intention, with the exception of a small portion, the size of a pinhead, and the patient has made an uninterrupted recovery. There is very little discharge now, and what discharge is taking place comes from the frontal sinus, which drains from the nostril. I can wash out the frontal sinus of the opposite side by a curved canula pushed up into the nose.

This other case is one of some interest, namely, a large bony cyst of the anterior end of the middle turbinated body, with the most extensive deviation of the septum that I have ever been called upon to correct. It was S-shaped up and down and antero-posteriorly. The upper portion on the right side was pushed against the middle turbinated body, so that the fissura olfactoria was obliterated. Posteriorly, the left side was occluded. He could not breathe through his nose, and he was greatly distressed. The first thing I removed was the large cyst of the middle turbinated body of the left side.

This was as large as a pigeon's egg. Now comes the most interesting phase of the case: the patient has had on both sides polypi spring into existence within a week. I have not examined him for nearly a week, and the last time I saw him the polypoid growths were diminished, but within a week after the operation both nostrils were so full of polypi that he was worse after than before the operation so far as nasal respiration goes.

The next point of interest is the cartilaginous ridge which has formed on the right side of the septum, notwithstanding the fact that all cartilage was removed in that region.

DISCUSSION.

DR. HOLINGER: I would like to ask Dr. Pierce why he did not operate on both frontal sinuses at once. In the *Zeitschrift fur Ohrenheilkunde*, Liebenmann described the operation of both sinuses with an H-shaped incision, that is Killian's incision on both sides, connected with a cross incision at the bridge of the nose. The double sinus operation is not at all very exceptional, and gives good results.

I showed a case with Killian's operation before this society, in which there was no connection of the frontal sinus with the nose, or ethmoidal labyrinth or maxillary sinus. In this case, too, the operation was done in a typical way, namely, the removal of the whole mucous membrane of the sinus, the removal of the roof of the orbit, followed by transplantation of the tissues of the orbit into the frontal sinus.

As to the other patient with polypi after the removal of a large cyst of the nose, I showed last winter a specimen before the German Medical Society representing the wall of a large cyst of the middle turbinate. A large bunch of polyps fell down into the nose, and occluded that side completely. At that time I looked up the literature on the subject, and was surprised to find nearly unanimous consent on the part of authors that these bone cysts are congenital. I do not think we have a right to call a cyst congenital that is so typical of an inflammatory origin.

This is the second case which I have known. The above deductions of a Japanese physician, Kichuchi, who has done the best work in this line, do not accord with the facts.

DR. BECK: These are certainly interesting cases, but I do not think Dr. Pierce does himself justice in showing the case he operated upon at this time. I believe if he were to exhibit this patient six

months later, after he had done a good job on the septum, and had established good drainage, he would be more satisfied. From the exterior it looks very well; but I have had an experience in a case of frontal sinus disease that I presented to you last year as cured by means of a Killian operation. This case presented a picture similar to that of Dr. Pierce, namely, a deflection of the nasal septum. I operated on the frontal sinus and did not provide for good drainage, hence there was a recurrence, and I had to reopen again, and not until the nostril was free, so far as the olfactory region of the upper part of the nose was concerned, did the patient remain well. I doubt whether Dr. Pierce's patient is well at this time.

The description of the two sinuses being involved in this case cannot be doubted, since the operator has passed a probe from one sinus to another. We do not have a history of suppuration from the right side of the nose, nor is there any evidence of any suppuration on this side.

The other case of frontal sinus disease reported by Dr. Pierce shows the good result from Killian's method and of paraffin injections. This is easily done in all these operations. After secondary contraction of the scar takes place there is an excavation, and this excavation can be filled out very nicely with a small amount of paraffin.

DR. INGALS: Dr. Pierce spoke of polypi coming down so soon. I want to ask him whether he supposes they were formed in that length of time, or whether they had been hidden away somewhere before? I have often seen large polypi within a few days after I had thought the nose was absolutely free. Certainly there were no polypi when I got through with the patient, but I found them within a week thereafter, and I had supposed that they were formed before, and that there was a little sac with nothing in it that filled up suddenly. I do not know what pathologists say about that. I simply ask the question for information.

As to the case in which he found two frontal sinuses connected, it recalls to my mind a case I operated on some years ago where there was no visible partition between the two and the posterior wall was entirely gone. We know that sometimes the sinus on one side may either be absent or very small and both sinuses may discharge normally through a single duct, so that it is not altogether singular that he found these sinuses involved at the same time.

As to the after-results of these operations, the patient can be very greatly benefited by the use of paraffin, as shown in this case, and

whether the paraffin is entirely innocuous or not is still, I think, open to question; but where it can be used and it works well it would be a great improvement in the appearance of Dr. Pierce's patient. In a number of cases I saw last spring that had been operated upon, the contractions made a hideous scar that would certainly be objectionable to a lady. This can be overcome by the paraffin, for a while at least, if there should be contraction in Dr. Pierce's case.

DR. GRADLE: I wish Dr. Ingals would give us more of the details of his operation on the frontal sinuses through the nose.

DR. INGALS: The operation I suggested for draining the frontal sinus was one that is applicable where we can get a probe into the sinus, and where this can be done we can make a free opening. I have a couple of patients who had disease of the frontal sinus, one of them apparently for ten years and the other for sixteen years. In both cases suppuration ceased within ten or twelve months. There was not so much pus as there is in those cases where Killian operated. I could not see anything that looked like pus. I have a gentleman upon whom I operated two months ago where the disease had been running for some years—I do not know how long—where the results seemed to be good. The operation is done by introducing a probe from a millimeter to two millimeters in diameter, and over this probe a hollow burr is run in. I run over the hollow burr a spiral tube to keep the burr from irritating the tissues, as it is turned, and the burr is connected with a dental engine and pressed in, and it cuts into the frontal sinus quickly. The pilot or probe projects beyond the burr a millimeter or a centimeter if you choose, so far as you like, and the burr cannot possibly get nearer than that, which prevents you from opening through the cerebral side of the frontal sinus. The operation seems desirable in suitable cases, even where one might want to do a radical operation, because free drainage can be established by putting in a little tube, and you all know the shape of the tube.

DR. PIERCE (closing the discussion): Killian advises against the double operation at a single sitting. There is nothing to be gained by it, and he finds that the shock of the double operation is comparatively much greater. Therefore, he operates, if both sinuses are affected, on a single sinus at a time, and I followed his advice in this case. Had I not been with and seen this method of Killian, I should not have operated on both sinuses at one sitting. It took nearly two hours to do this operation, and the patient was quite weak at the end of that time. However, I believe that this sinus on

the right side has a chance of getting well without any further operation. The sinus now drains thoroughly and each day there is a decided lessening of the discharge. The question has occurred to me whether this large cavity over the right side is a part of the left sinus. Possibly it is. There may be only one sinus in this case. It may be an enormous left sinus which reaches over the right side, and there may be a very small one still further to the outer portion of this sinus.

In answer to Dr. Beck's remarks I would say that the sub-mucous resection of the septum should not be performed in the presence of empyema of the sinuses. Killian puts that down as one of the contraindications for the operation.

In answer to Dr. Ingals' question, I believe these polypi on the left side were formed *in toto* within a week, because I was careful in examining two or three days afterwards to note the absence or presence of polypi, and there were none, so far as I could ascertain by careful examination. The location of some of these polypi render it impossible that they were overlooked.

Diffuse Infiltration of the Right Side of the Naso-Pharynx accompanied by Cranial Nerve Paresis. By DR. OTTO T. FREER. *(Published in full in this issue of* THE LARYNGOSCOPE, *page 845.)*

DISCUSSION.

DR. O. STEIN: I did not understand whether Dr. Freer made any mention in regard to the sphenoidal sinus or not, and whether there were any findings whatsoever in regard to the condition of that sinus.

DR. GRADLE: Dr. Freer's case reminds me of a similar observation. A man came to me this January, about sixty years of age, well preserved, with paralysis of the externus and internus of the right eye, and paralysis of the externus of the left eye; while the eyes themselves were otherwise normal. The man stated that he had defective hearing particularly on the right side. I could not trace the condition of the recti muscles to any intracranial process, but continuing my investigation I found his breathing was not good, especially on the right side. On looking into the nostrils, nothing could be seen except slightly deflected septum. The pharyngeal tonsil was enlarged towards the right, and what appeared to be a diffuse swelling extended to the Eustachian tube of the right side. I suspected at once a new growth, possibly tuber-

cular. There was slight infiltration of the apex of the right lung, and a few tubercle bacilli were found in the sputum.

In order to eliminate syphilis, a thorough course of antisyphilitic treatment was carried out, but gave no results. The man was expecting to die, when he rallied suddenly, went South for a couple of months, and returned later in moderately good health. In the meantime, a lymph gland on the right side of the neck of walnut size had grown to be the size of a small apple. The growth in the pharynx had extended so that now on inspection through the mouth one could see the right half of the soft palate pushed forwards, having the appearance almost of a case of quinsy at its height. I could not remove any post-pharyngeal tissue with the tenotome, as I tried to. The contour was too smooth, so that my intention to have a microscopical examination of this tissue made was frustrated. Being unable to do anything more than to treat him in a palliative way, I turned him over to Dr. Pusey for X-ray treatment. His condition, much to my surprise, has improved wonderfully under this treatment. The lymph node diminished materially in the course of three or four weeks. The swelling in the throat had not continued to increase as it had previously.

I was not sure that it had diminished in the visible part of the palate or at the roof of the pharynx, as far as I could examine it with the mirror, but he felt more comfortable, and continued to improve for three or four weeks, after which I lost track of him. In all probability the case is one of diffuse carcinoma.

DR. FREER (closing the discussion): In regard to the question concerning the sphenoidal sinus; I have not probed this sinus, as there seemed to be no indication for doing so. There has been no purulent discharge in either nostril whenever I have examined the patient, and the location of the disorder does not indicate sphenoidal sinuitis. Nevertheless, I intend to follow Dr. Stein's suggestion and to pass a probe into the sinus to make sure that there is no pus coming from it.

I am glad to hear that Dr. Gradle has had a patient whose symptoms were so nearly like those presented by mine and am interested to find that there was the same difficulty in determining the exact pathological cause.

DR. STEIN: I asked Dr. Freer a question because I know of a case that presented somewhat similar ocular symptoms which was relieved immediately by an opening made into the sphenoidal sinus.

DR. FREER: Was there suppuration?

DR. STEIN: There was no sign of suppuration at the time. This opening was made simply for the purpose of experimentation. The anterior wall was chiseled and there was a free discharge of pus, after which the symptoms gradually disappeared.

DR. FREER: Was there extensive paresis of the ocular muscles?

DR. STEIN: Not so extensive as in your case. The optic nerve of this case was affected. It is not my case, and I am not familiar with the details of it.

(Since the above discussion the sphenoidal sinus on the affected side has been entered and found normal. O. T. Freer.)

A Case of Laryngeal Tuberculosis with Exhibition of Specimen.

By DR. O. J. STEIN. *(Published in full in this issue of* THE LARYNGOSCOPE, *page 876.)*

A New Tonsillotome.

DR. EDWIN PYNCHON exhibited this instrument which was designed by him.

SELECTED ABSTRACTS.

Resection of the Nasal Septum.—LEON E. WHITE.—*Boston Med. and Surg. Journ.*, Oct. 12, 1905, pp. 413-416.

This article is mainly an historical review of the development of the correction of deformities of the septum by submucous resection. The earliest date found for this procedure is 1847. This was before the use of the head mirror (1857-Czermak) so that it must have been blind work. Cocaine was introduced into rhinology by Jelinek in 1884, adrenalin came in some seven or eight years ago, so that this operation can be done under ideal conditions. Krieg, in 1898, seems to be the first man to push the operation into prominent notice. His operation was submucous in name only. He found it difficult to preserve the triangular flap which he dissected free on the convex side. It rolled up and could not be stitched into place readily, so that he soon disregarded it and left its place to granulate. Killian in 1899, did away with the flap by using a vertical or slanting incision. This made the operation live up to its name, made it a true submucous resection. Stubbs in 1893 started his incision along the free border of the quadrangular cartilage.

All this time different men have been devising gauges, chisels, and conchotomes for dealing with the bony part of the septum and for the spurs which so often complicate septal deformities. Among these instruments two stand out as especially useful, Killian's speculum, and Ballinger's modification of Killian's cartilage knife, known as Ballinger's swivel cartilage knife. Killian's long thin-bladed speculum was devised for exploring the middle meatus. Its usefulness for this purpose is limited, but its usefulness for holding the mucous membrane of the two sides of the septum apart after they have been elevated, and for guarding them against injury while the punch or knife dissects out the cartilage or bone, is very great. Ballinger's swivel knife takes out larger pieces of cartilage than any other instrument and does this very quickly and neatly. This knife is about two years old.

The operation of submucous resection in the course of its development, has shown certain disadvantages and has had to contend with a certain amount of criticism. For instance, "Müller has had moderate sinking of the bridge of the nose after extensive removal

of the cartilage well up under the bridge. He therefore advises leaving a quarter of an inch margin on the upper anterior border of the septum, that is, under the bridge. Until the vertical incision came in, the flap was not preserved, and a large raw surface was left to heal after the fashion of the raw surface left by the older and quicker operations which this operation attempted to rival. A further objection was that the operation was slow and difficult, so that many men said it was not worth while and preferred the former, quicker methods.

White summarizes his present technique as follows: he operates with the patient reclining. He gets his anesthesia by injecting under the mucous membrane one per cent cocaine. In young subjects or with especially nervous and timid adults, he uses ether. Ether makes the operation more difficult. He uses the anterior vertical incision which can, if necessary, be prolonged backward at the top or at the bottom. In all cases where the mucous membrane cannot be preserved on the convex side, as much as possible should be saved. Where the deflection is far back and includes much bone, a horizontal incision added to the vertical one, is a great help. When a flap is used it should be sutured back into place. When the vertical incision is used, packing alone is sufficient to hold the two layers of mucous membrane together until union has begun. The time for the operation varies from half an hour to an hour and a half. With the vertical incision healing is complete in one week, where the flap is used, in four to eight weeks. The writer does not operate on children under fourteen.

This abstract forms a good opportunity to add a few words on this important subject. The men who are operating to-day are divided into two groups: the younger group, who have had no training in any other method of correcting deformities of the septum except the submucous method; and the men who have operated after the older methods and have added the submucous operation to their older operative procedures. I belong to the second class. I feel that for deviations which are anterior, and for deviations which run moderately far back on to the bony septum, that the submucous operation is by far the best method. It is essential, however, that you have a quiet patient, that the operator be fresh, and that he be free from the pressure of a large waiting clinic. When the element of hurry comes in it is common to perforate or lose the flap on the convex side. With my present technique in dealing with posterior deviations, I can get quicker operating results, and just as good a

result for the patient by the older methods, or, to be specific, by using the modified window operation, which consists of a basal cut, an anterior cut in front of the deviation, and fracture of the tip of the vomer. The flap is then buttoned over into place. This requires ether, occupies ten minutes of operating time, and means wearing a nasal splint for some seven days, and after healing is complete often requires the removal of a residual basal spur. I acknowledge that the more I use the submucous method, the further back on the septum I am able to go with it, but as yet I cannot follow those who say, "whatever and wherever the deformity," the only method of its correction is submucous resection.

In regard to small spurs with thin bases, I think it is a waste of time to laboriously shell them out. A sharp saw removes them quickly and satisfactorily. The objection raised against this is that there is a raw surface left to heal by granulation. You often have the same thing when you lose or tear your flap by the submucous method. If you saw off the spur and protect your first packing by Cargile membrane, granulations are not excessive and the epithelium soon grows over the denuded surface. The amount of discussion which the submucous operators raise about a small granulating area on the septum, is all out of proportion to its importance. Unless the turbinates opposite are injured, this point, put in broad surgical perspective, is insignificant.

A medical friend of mine make a remark in connection with extensive resection of the septum, which is suggestive. He said that the idea of having but little, if any, cartilaginous or bony section left, to have, as it were, but a rim of septum, was not pleasant and gave a feeling of insecurity. On that account he would prefer for himself, the modern window operation. It is claimed that after submucous resection of the septum, cartilage is formed again. There is some proof that this does actually occur. When it is proved that this is the rule, the great advantages of the submucous operation for corrections of deformities of the septum will be still further increased. MOSHER.

Papilloma of the Larynx in Children.—J. PAYSON CLARK.—*Boston Med. and Surg. Journ.*, Oct. 5, 1905, pp. 377-381.

Papilloma of the Larynx in children is a benign tumor of unknown etiology. Histologically it is in the same class as the common skin wart, since both the skin wart and the respiratory tract are formed from the epiblast. Clinically both the common wart and papilloma show the same mild contagiousness. When papilloma

are removed the irritation of the operative procedure often starts their growth in a new locality. Papilloma may grow anywhere in the larynx, between the cords, above the cords, below them, or even in the trachea.

Papillomata are rare. The statistics on this point are as follows: In one set of children up to ten years of age, 7,324 admissions gave ten cases, and in another set of 5,808 children up to thirteen years old, there were sixteen cases. In the period from 1889 to 1904 inclusive, Clark found 12 cases in 12,623 children under fourteen. This is a slightly smaller proportion for the American clinic.

Rare as papillomata are, and they average in a large clinic not quite one a year, they often lead to surgical emergencies so that their treatment is very important. Since they are a form of new growth, their removal was attempted, of course, along surgical lines. It was found, however, that they recurred nearly always. At first it was said that this was due to incomplete removal, but experience soon proved that this was not the chief reason. The following dramatic case illustrates this point. A girl of thirteen was operated on for papilloma by tracheotomy followed by laryngo-fissure with thorough removal of the growth. Recurrence took place and two months later the larynx was split again and the actual cautery used on the papilloma. A few months later again the larynx was opened and mono-chloracetic acid used on the site of the growth. Still another recurrence, again laryngo-fissure, and this time employment of carbolic acid. The tracheotomy tube was now left in for six years and operative interference abandoned. At the end of this time the tube was taken out, and a year later than this the surgeon had the satisfaction of reporting the case cured. Other men have tried similar procedures, seldom, however, quite so radical ones, but failure has been the rule, so that the writer declares that thyrotomy for papilloma in children is unjustifiable.

What form of treatment then does give results? MacKenzie treated seven cases by tracheotomy and prolonged wearing of the tube and obtained five cures. No other method has given results like these. If this form of treatment is the one adopted, and it certainly seems that it should be, it is a safe rule in dealing with these cases to open the trachea when complete aphonia is present and not to wait for the appearance of dyspnoea. Experience has shown that the danger of respiratory affections after tracheotomy is not great, and that children can wear the tube for years with impunity.

Of the writer's fourteen cases from the Massachusetts General

Hospital clinic, nine were boys and five girls. Age: five cases were two years or younger, when symptoms were first noted, and in the majority of cases one to three years elapsed before treatment was begun. Of ten cases which had preliminary tracheotomy, three died of broncho-pneumonia.

After citing his cases the writer closes his paper by discussing the forms of treatment. According to him there are two methods, the indirect (laryngeal mirror), and the direct (Kirstein's autoscope, and Killian's tubes). As a fundamental principle Clark lays down the following: These growths will not yield to any form of treatment however radical, until the period of active growth is past. Cases of rapid recurrence belong exclusively to childhood when the cell activity is at its height. Our ignorance of the etiology of these growths leaves us utterly unable to define the extent of this period, but clinical experience proves its existence. In view of the fact that it is impossible to tell in a given case how attempts at removal will affect the papilloma, and in view of the fact that in a large majority of cases such attempts affect it unfavorably, the first and routine procedure should be to open the trachea whenever complete and permanent aphonia is present.

It is not the same when these growths are found in an adult. After the period of growth is past removal of the papilloma without tracheotomy is to be advised. Here a cure can be obtained. Coming back to children, Clark says, Let the child wear the tube until the period of growth is over, then if any growth remains it is justifiable to remove it. Do not begin attempts at removal before ten years of age.

Comment.—It seems justifiable to me at the time that the treacheotomy is done, to remove as much of the growth as possible. It may be one of slow growth, so just that much time may be gained. At any rate the time of recurrence will give the rapidity of the growth of the tumor for further guidance in its treatment.

In regard to the method of operating, the direct method (Killian's tubes) seems to me to be destined to supplant practically all the others. The thin pliable necks of children generally allow the larynx to be seen easily. Theoretically this method of approach to the larynx should be equally valuable with adults. In practice, however, it is often very hard to make this method come up to expectation. It is to be hoped that improved technique will shortly do away with these objections.

MOSHER.

Two Cases of Lateral and Sigmoid Sinus Thrombosis, One with Jugular Exsection. Recovery, Notwithstanding Meningeal Symptoms.—CHEVALIER JACKSON. (Pittsburg.)—*St. Louis Med. Rev.*, March 25, 1905.

One of these patients was a girl of nine years; the other a youth of nineteen. Points of interest cited by the author in first case are:

"Prompt and perfect recovery from septic sinus thrombosis after drainage, without jugular exsection, due to organization of the clot in the jugular bulb. A very unsafe precedent to follow."

"Recovery after grave meningeal and cerebral symptoms that are usually looked upon as warranting a hopeless prognosis." The writer does not believe that these symptoms were in this case due to an infective lepto-meningitis; but in view of this case it is manifestly impossible to be certain that lepto-meningeal *symptoms* may not be due to operably curable lesions. Hence, operation is justifiable in such cases and a ray of hope may be held out to parents.

"Obliteration of the sinus by Nature, by the organization of a thrombus in and above the jugular bulb. Like Nature's amputations, spontaneous cures of septic sinus thrombosis are possible if the patient can survive. In the present case death would have resulted in a few days from toxaemia from the torcular end of the clot, which was septic and against which the circulation was unprotected."

Points of interest in the second case are:

"The writer is utterly at a loss, in the view of the pathologic findings on the operating table and in the laboratory, to account for the absolutely normal temperature prior to operation. We are accustomed to see normal temperatures in ordinary everyday mastoid cases, but not in such as this."

"The utter harmlessness of exploration and jugular exsection if the patient's condition is fairly good and not too profoundly poisoned with toxins."

EATON.

A Case of Lagorrhinos.—M. TSAGYROGLOUS.—*Monatsschr. f. Ohrenheilk.*, Berlin, Feb. 1905.

Under the above designation, the author describes a peculiar deformity of the nose. Two bony ridges extend upwards from the tip of the nose in an oblique direction and end at the frontal eminences.

YANKAUER.

Vegetating Rhinitis.—H. BICHELONNE.—*La vie méd.*, No. 8, Aug. 1904.

This is a chronic inflammatory affection of the nasal mucous membrane with characteristics well differentiated from lupus or chronic tuberculosis of the nose.

The symptoms are a thin mucous secretion and nasal voice, but with no crust, ozena nor epistaxis. An examination of the nasal cavity shows small nodosities protruding from the surface of the mucous membrane, and appearing like yellowish-grey granulations of the size of a hemp seed, with a hard base, and a tendency to bleed; but there is no ulceration.

From a pathological standpoint, the tumors consist of firm connective tissue, containing leucocytes and lymphocytes of a granular aspect. No epithelioid nor giant cells.

The removal is affected by means of the cold snare or the curette after local anesthesia. In order to prevent recurrence, the sites of the growths should be destroyed with lactic acid.

SCHEPPEGRELL.

Reflex Cough.—EUGENE POLLAK.—*Monatsschr. f. Ohrenheilk.*, Berlin, Dec., 1904.

The center for coughing is situated in the medulla oblongata above the respiratory center, and coughing has been experimentally produced by irritation of this center. Cough may be produced by irritation of any part of the respiratory tract, but the bifurcation of the trachea and the posterior laryngeal wall are particularly sensitive points. Reflex coughs may have their origin in chronic inflammatory conditions of the nose, naso-pharynx and pharynx; as well as from the pleura and pericardium. Reflex coughs from the stomach, from the presence of tape-worms, and gall-stones, and from diseases of the genital and urinary tracts have been described by various authors.

Among the more sensitive points from which a reflex cough may take its origin are the external auditory meatus and the tympanic cavity. The author has made a series of experiments on this subject in a number of cases, and describes them in a very full and complete manner, to which justice cannot be done in an abstract.

YANKAUER.

The Relation between Diseases of the Nose and Eye.—SCHMIEGELOW.—*Communication from St. Josef's Hospital, Laryngological Division, 1904.*

Schmiegelow gives a short résumé of his personal experiences in the domain of orbital diseases of nasal origin. Among sixty-three patients, suffering from disease of one or more of the accessory sinuses, 17 were found where the empyema was accompanied by eye symptoms, as; excessive lacrimation, blepharo conjuctivitis, ciliary neuralgia, violent orbital pains, strabismus convergens; five patients showed dislocation of the bulbus oculi. One patient, a girl of eighteen years, suffered with acute exopthalmus and chemosis of the right eye, following an acute empyema of the right frontal sinus. She recovered without operation in the course of two weeks. Schmiegelow also saw two cases of orbital abscess and phlegmon develop, after an acute inflammation of the frontal sinus, in a ten and a fifteen-year old boy. The various possible eye complications are considered, and a complete survey of the rich literature of this subject is added.

KIAER.

Additional Symptoms Caused by Adenoid Vegetations.—JOH. FISCHER.—*Ugesk. f. Læger*, Copenhagen, page 751, 1904.

The same material, 500 cases, that Fischer used in an earlier communication (Laryngoscope, p. 163, 1903), is made the foundation of these investigations. Additional symptoms were found as follows: *Epistaxis, 10%; Enuresis, 15%; Headache, 44%; Anaemia, 34.2%;* Aprosexia, 35.8%; only patients over eight years of age being considered. Most frequently the Aprosexia was accompanied by nasal stenosis in 89%; less frequently by difficulty of hearing, in 60%; and more rarely by anaemia, in 31%. 18% of the patients stammered and three patients had faults of articulation. This large percentage of patients with speech defects is to be explained by the fact that this clinic is frequented by such patients.

KIAER.

BOOK REVIEWS.

Coakley's Laryngology. A Manual of Diseases of the Nose and Throat. By CORNELIUS G. COAKLEY, A.M., M.D., Professor of Laryngology in the University and Bellevue Hospital Medical College; Laryngologist to Columbus Hospital, etc., New York. New (3d) edition, revised and enlarged. In one 12mo. volume of 594 pages, with 118 engravings and 5 colored plates. Cloth, $2.75, net. Lea Brothers & Co., Publishers, Philadelphia and New York, 1905

For the third time in six years, we take pleasure in calling attention to Dr. Coakley's eminent satisfactory manual on "Diseases of the Nose and Throat." The demand for a third addition in so short a time is evidence of its well deserved popularity and assures to the practitioner and student a volume containing the latest advances in a rapidly progressive department of medicine.

As in the previous editions, the importance of diagnosis is recognized by special attention, and the author presents very fully the methods of examination including microscopic and bacteriological tests.

The subject of treatment is taken up in order with each diseased condition treated and is based upon the author's personal experience, surgical as well as medical. The final chapter on Therapeutics contains a classification of drugs according to their local actions and a number of useful prescriptions together with indications for their employment. A very convenient system of references to these additional remedies appears in the index and makes them readily accessible. B.

The Era Key to the U. S. P. A Complete List of the Drugs and Preparations of the United States Pharmacopoeia. Eighth decennial revision (1905). Vest-pocket size; 83 pages; price 25 cents. The Pharmaceutical Era, Publishers, 90 William St., New York.

The publishers announce a new edition of the well-known "Era Key to the U. S. P.," whose object is to further the introduction and employment of the official drugs and preparations of our National standard, the United States Pharmacopoeia, the eighth revision of which is now in force. The book comes in vest-pocket size and gives in a "nut-shell" all the essential information required by the physician who desires to prescribe pharmacopoeia remedies—their official names, synonyms and constituent parts, with average doses in both metric and English systems.

B.